

Report of the Committee on Specifications and Tolerances

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300 INTRODUCTION

This is the final report of the Committee on Specifications and Tolerances (S&T) (Committee) for the 90th Annual Meeting of the National Conference on Weights and Measures (NCWM). The report is based on the 90th Interim Report offered in NCWM Publication 16, "Committee Reports," the Addendum Sheets issued at the Annual Meeting, and actions taken by the membership at the Voting Session of the Annual Meeting.

Table A identifies the agenda items in the report by Reference Key Number, Item Title, and Page Number. The item numbers are those assigned in the Interim Meeting Agenda. Voting items are indicated with a "V," or if the item was part of the consent calendar by the suffix "VC" after the item number. Items marked with an "I" after the reference key numbers are information items. Items marked with a "D" after the key numbers are developing issues. The developing designation indicates an item that while it has merit, it may not be adequately developed for action at the national level. Developing items inform parties about issues that are developing in different localities or in the regional associations. A developing item is returned to the submitter to develop further before any action is taken at the national level. The Committee withdrew items marked with a "W." Items marked with a "W" generally will be referred to the regional weights and measures associations because they either need additional development, analysis, and input, or did not have sufficient Committee support to bring them before the NCWM. Table B lists the Appendices to the report, and Table C provides a summary of the results of the voting on the Committee's items and the report in entirety.

This Report contains many recommendations to revise or amend National Institute of Standards and Technology (NIST) Handbook 44 (HB-44), 2005 Edition, "Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices." Proposed revisions to the handbook(s) are shown in **bold face print** by ~~striking-out~~ information to be deleted and underlining information to be added. Proposed nonretroactive requirements are printed in **bold-faced italics**.

Note: The policy of NIST is to use metric units of measurement in all of its publications; however, recommendations received by the NCWM technical committees have been printed in this publication as they were submitted and may, therefore, contain references to inch-pound units.

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Table C
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Reference Key Number	House of State Representatives		House of Delegates		Results
	Yeas	Nays	Yeas	Nays	
300 (Consent Calendar)	36	0	36	0	Passed
320-8	27	10	28	8	Passed
330-1	37	0	36	0	Passed
360-1	32	3	31	3	Passed
360-2	37	0	33	1	Passed
300 (Report in its Entirety Voice Vote)	All Yeas	No Nays	All Yeas	No Nays	Passed

Details of all Items
(In order by Reference Key Number)

310 GENERAL CODE

- 310-1 W G-A.1. Commercial and Law Enforcement, G-S.1. Identification; Built-for-Purpose Software Based Devices, Table G-S.1. Identification, G-S.1.1. Location of Marking Information for Not Built-For-Purpose, Software-Based Devices, and Appendix D; Definition of Built-for-Purpose Device, Measuring Device (General), Measuring System (General), Electronic Devices, Not-Built-for-Purpose Device, Metrological Software Version (Revision), and Weighing Device (Instrument)**
(This item was withdrawn.)

Source: Carryover Item 310-1. (This proposal first appeared on the Committee's 2003 agenda.)

Recommendation: Amend General Code paragraph G-A.1. Commercial and Law Enforcement Equipment as follows:

G-A.1. Commercial and Law Enforcement Equipment. - These specifications, tolerances, and other technical requirements apply as follows:

- (a) To commercial ~~weighing and~~ measuring devices or systems equipment; that is, to weights, and measures, and ~~weighing and~~ measuring devices or systems commercially used or employed in establishing the size, quantity, extent, area, or measurement of quantities, ~~things, produce, or articles~~ for distribution or consumption, purchased, offered, or submitted for sale, hire, or award, or in computing any basic charge or payment for services rendered on the basis of quantity determination ~~weight or measure~~.
- (b) To any accessory attached to or used in connection with a commercial ~~weighing or~~ measuring device when such accessory is so designed that its operation affects the accuracy of the device.
- (c) To ~~weighing and~~ measuring devices or systems equipment in official use for the enforcement of law or for the collection of statistical information by government agencies.

(These requirements should be used as a guide by the weights and measures official when, upon request, courtesy examinations of noncommercial equipment are made.)

(Amended 200X)

Amend General Code paragraph G-S.1. Identification as follows:

G-S.1. Identification. - All equipment, except weights and separate parts necessary to the measurement process but not having any metrological effect, shall be clearly and permanently marked in accordance with Table G-S.1. for the purposes of identification with the following information:

- (a) the name, initials, or trademark of the manufacturer or distributor;
- (b) a model designation that positively identifies the pattern, ~~or~~ design, or metrological version or revision of the device in accordance with Table G-S.1.;
 - 1. *The model designation shall be prefaced by the term "Model," "Type," or "Pattern." These terms may be followed by the term "Number" or an abbreviation of that word. The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.). The abbreviation for the word "Model" shall be "Mod" or "Mod." Prefix lettering may be initial capitals, all capitals or all lower case.*

[Nonretroactive as of January 1, 2003]

(Added 2000) (Amended 2001)

(Amended 200X)

- (c) *a nonrepetitive serial number, except for equipment with no moving or electronic component parts and not built-for-purpose, ~~software-based~~ electronic devices;*
[Nonretroactive as of January 1, 1968]
(Amended 2003 and 200X)

1. *The serial number shall be prefaced by words, and abbreviation, or a symbol, that clearly identifies the number as the required serial number.*
[Nonretroactive as of January 1, 1986]
2. *Abbreviations for the word "Serial" shall, as a minimum, begin with the letter "S," and abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., S/N, SN, Ser. No., and S. No.).*
[Nonretroactive as of January 1, 2001]

- ~~(d) the current software version designation for not built-for-purpose, software-based devices;~~
~~[Nonretroactive as of January 1, 2004]~~
(Added 2003)

- (e)** *an NTEP Certificate of Conformance (CC) number or a corresponding CC Addendum Number for devices that have a CC. The CC Number or a corresponding CC Addendum Number shall be prefaced by the terms "NTEP CC," "CC," or "Approval." These terms may be followed by the term "Number" or an abbreviation of that word. The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.)*
[Nonretroactive as of January 1, 2003]

The required information shall be so located that it is readily observable without the necessity of the disassembly of a part requiring the use of any means separate from the device.
(Amended 1985, 1991, 1999, 2000, 2001 and 2003)

Delete General Code paragraph G-S.1.1. Location of Marking Information for Not-Built-for-Purpose, Software-based Devices and renumber G-S.1.2. Remanufactured Devices and Remanufactured Main Elements as follows:

~~**G-S.1.1. Location of Marking Information for Not-Built-for-Purpose, Software-based Devices. For not-built-for-purpose, software-based devices, the following shall apply:**~~

- ~~(a) the manufacturer or distributor and the model designation shall be continuously displayed or marked on the device (see note below), or~~
- ~~(b) the Certificate of Conformance (CC) Number shall be continuously displayed or marked on the device (see note below), or~~
- ~~(c) all required information in G-S.1. Identification. (a), (b), (c), and (e) shall be continuously displayed. Alternatively, a clearly identified "view only" System Identification, G-S.1. Identification, or Weights and Measures Identification shall be accessible through the "Help" menu. Required information includes that information necessary to identify that the software in the device is the same type that was evaluated.~~

~~**Note:** Clear instructions for accessing the remaining required G-S.1. information shall be listed on the CC. Required information includes that information necessary to identify that the software in the device is the same type that was evaluated.~~

~~[Nonretroactive as of January 1, 2004]~~
(Added 2003)

G-S.1.12. Remanufactured Devices and Remanufactured Main Elements. - All remanufactured devices and remanufactured main elements shall be clearly and permanently marked for the purposes of identification with the following information:

- (a) The name, initials, or trademark of the last remanufacturer or distributor;
 - (b) The remanufacturer's or distributor's model designation if different than the original model designation.
- [Nonretroactive as of January 1, 2002]
(Added 2001)

Note: Definitions for “manufactured device,” “repaired device,” and “repaired element” are also included (along with definitions for “remanufactured device” and “remanufactured element”) in Appendix D, Definitions.

Add a new Table G-S.1. Identification as follows:

Table G-S.1. Identification		
	<u>Built-for-Purpose Instruments, Elements, or Systems</u>	<u>Not-Built-for-Purpose Devices or Elements</u>
<u>Name, initials, or trademark of the manufacturer or distributor</u>	<u>M</u>	<u>D²</u>
<u>Model designation</u>	<u>M¹</u>	<u>D²</u>
<u>Specific model designation³</u>	<u>M¹ or D</u>	
<u>Serial number</u>	<u>M</u>	<u>Not required</u>
<u>Metrological version or revision designation³</u>	<u>N/A</u>	<u>D</u>
<u>Certificate of Conformance (CC) number</u>	<u>M or D</u>	<u>D²</u>
<u>M:</u>	Physically and permanently marked	
<u>D:</u>	<p><i><u>Either: (1) displayed by accessing a clearly identified view only System Identification, G-S.1. Identification, or Weights and Measures Identification accessible through the “Help” menu. Required information includes that information necessary to identify the software in the device is the same type that was evaluated, or</u></i></p> <p><i><u>(2) continuously displayed. Note: For revision or software version number, clear instructions for accessing this information shall be listed on the CC in lieu of the “Help” menu. Required information includes that information necessary to identify the software in the device is the same or subsequent type that was evaluated.</u></i></p> <p><i><u>(Nonretroactive as of January 2004)</u></i></p>	
<u>Note 1:</u>	<p><i><u>As a minimum, the model designation (positively identifying the pattern, design, type, series, generic, or trademark designation) must be marked on the device. If the model designation changes with differing parameters such as size, features, options, intended application, not Handbook 44 compliant, construction, etc., the specific model designation shall be physically marked or continuously displayed or be capable of being displayed.</u></i></p> <p><i><u>(Nonretroactive as of January 200X)</u></i></p>	
<u>Note 2:</u>	<p><i><u>As a minimum, either the manufacturer or distributor and the model designation, or the CC Number shall be continuously displayed. Clear instructions for accessing the remaining required G-S.1. information shall be listed on the CC, which may be available as an unaltered copy of the CC or printed by the device or through another on-site device.</u></i></p> <p><i><u>(Nonretroactive as of January 200X)</u></i></p>	
<u>Note 3:</u>	<p><i><u>Metrological version or revision designation for devices with downloadable or field programmable software.</u></i></p>	

(Table Added 200X)

Add new terms and definitions to Appendix d, Definitions, as follows:

measuring device (general) – A device (instrument) intended to be used to make measurements, alone or in conjunction with supplementary devices. (VIM)[1.10]

measuring system (general) - An instrument or group of instruments that serves to make measurements, alone or in conjunction with supplementary devices. (VIM)[1.10]

electronic devices – A device operating by the principles of electronics, which may consist of one or more subassemblies and performs a specific function(s). (ASTM)[1.10]

not-built-for-purpose device -- Any electronic peripheral or auxiliary device or element which was not originally manufactured with the intent that it be used as, or part of, a weighing or measuring device or system. [1.10]

metrological software version (revision) – A designation that specifically defines the metrological software version used in a measuring instrument, system, or peripheral/auxiliary device with field programmable or downloadable metrological software). [1.10]

weighing device (instrument) -- A measuring instrument that serves to determine the mass of a body by using the action of gravity on said body. The instrument may also be used to determine other quantities, magnitudes, parameters or characteristics related to the determined mass. According to its method of operation, a weighing instrument is classified as an automatic or non-automatic instrument. (OIML R76)[1.10]

Amend the definition for “built-for-purpose device” as follows:

built-for-purpose device - Any main, peripheral, or auxiliary device or element which was manufactured with the intent that it be used as, or part of, a ~~weighing or~~ measuring device or system.

Background/Discussion: In 2003, paragraph G-S.1.1. was added to allow manufacturers of “not-built-for-purpose” devices to “display” the markings required in paragraph G-S.1. as an alternative to physically marking the required information on the device. Manufacturers of “built-for-purpose” devices have requested that paragraph G-S.1. be amended to provide a similar option for the “display” of the paragraph G-S.1. required markings on “built-for-purpose” devices.

At the 2004 NCWM Annual Meeting, the Committee made this proposal an information item because of concerns stated by some manufacturers that “built-for-purpose” devices were being treated differently than “not-built-for-purpose” devices. In response to this concern, the Committee asked that the Weighing and Measuring Sectors develop language acceptable to both weighing and measuring device manufacturers.

At its Fall 2004 meeting, the Weighing Sector reviewed the information from the Committee, previous Sector recommendations, and information regarding international requirements. The Sector also reviewed an alternate recommendation from NIST Weights and Measures Division (WMD), which included changes to paragraph G-A.1. The most significant change to paragraph G-A.1. was the elimination of the term “weighing” and utilization of the more general term “measuring” for devices or systems that measure mass, length, or volume. The WMD alternate proposal included new and amended definitions and addressed concerns raised during the Committee’s deliberations on this item. The WMD proposed definition for a “weighing device” describes it as a “measuring instrument” that serves to determine the mass of a body by using the action of gravity on said body. Although this change is a departure from conventional terminology for “scales,” it is consistent with OIML recommendations and facilitates harmonization between Handbook 44 and international standards. WMD revised the definition for “not-built-for-purpose” devices to clarify that they are auxiliary or peripheral equipment devices and systems, but they are part of the weighing or measuring system process. Some of the private Sector members repeated their earlier comments that current technology permits the electronic display of required identification information and there is no technical justification for treating “built-for-purpose” devices differently than “not-built-for-purpose” devices. Additionally, WMD’s proposed definitions would reclassify most measuring devices according to the physical property being

measured. Since WMD's proposed definition for measuring devices applies to all types of devices, some concern was expressed that laws and regulations would need to be changed because many state statutes refer to both "weighing and measuring" devices. The Weighing Sector supported the WMD alternate proposal; however, the Sector changed the marking requirement for metrological version or revision designation in Table G-S.1. for "built-for-purpose" instruments, elements, or systems from WMD's proposed designation of "marked or displayed (M or D)" to "not applicable (NA)" and added a definition for "weighing device." The Weighing Sector agreed to send the WMD alternate proposal with these modifications to the NTETC Measuring Sector and regional associations for their review and comments.

At the October 2004 Northeastern Weights and Measures Association Meeting, several participants indicated that the requirements for "built-for-purpose" and "not-built-for-purpose" devices should be the same. An Associate member commented that manufacturers should be trusted to report metrological updates to software since requirements for reporting current software version numbers hampers innovations in software development.

At its October 2004 meeting, the Measuring Sector also reviewed the recommendation developed by WMD since that was the only alternate proposal ready for review. The members agreed that the majority of the changes proposed to include "built-for-purpose" devices are more applicable to weighing devices than they are to measuring devices. One member objected to the proposal to eliminate references in paragraph G-A.1. to the term "weighing" and the dual use of the term "measuring" to refer to all forms of measurement including weighing. The member stated that the proposal was in conflict with the historic use of the term "measurement" in the United States. The Sector agreed to forward a recommendation to the Committee that the proposal to include marking requirements for "built-for-purpose" devices in paragraph G-S.1. Identification be withdrawn from the S&T agenda.

At its October 2004 meeting, the Southern Weights and Measures Association (SWMA) S&T Committee did not include this or other items requiring further development on its agenda for a vote of the members; however, the SWMA did accept comments during the open hearings. The SWMA learned that the Scale Manufacturers Association (SMA) wanted the requirements in Table G-S.1. for "built-for purpose" instruments, elements, or systems to allow markings for name, model, and serial number to be either physically marked (M) or displayed (D) just like requirements in the table for specific model designation or CC. One manufacturer of retail motor-fuel dispensers supported the recommendation on the condition that the requirement for metrological revision designation for "built-for purpose" instruments, elements, or systems is changed from "M" or "D" to "N/A" as recommended by the Weighing Sector. The SWMA forwarded these comments to the Committee without taking a position on the proposal.

At the 2005 NCWM Interim Meeting, the SMA opposed this item because it did not treat "built-for-purpose" and "not-built-for-purpose" devices equally and recommended the NCWM form a Work Group to further develop the proposal. The Committee heard support for the alternate proposal as modified by the Weighing Sector. The Committee considered withdrawing this item due to a lack of support from the group of manufacturers that originally submitted the proposal. After some discussion the Committee agreed to retain the Weighing Sector's latest alternate language shown in the recommendation above as an information item and urged the NTETC Sectors and SMA to develop a proposal they all support prior to the 2006 Interim Meeting. If the NTETC Sectors and SMA do not provide an alternative proposal that resolves their concerns with the current proposal, the Committee may withdraw this item from its agenda.

At the 2005 NCWM Annual Meeting, the Committee concluded that there was no support for this proposal and decided to withdraw it. The regional associations, the NTETC Sectors, and associations of device manufacturers may develop and submit a new proposal if they are able to resolve the concerns discussed above.

For more background information, refer to the 2003 and 2004 S&T Final Reports.

310-2 I G-T.1. (e) Acceptance Tolerances

Source: National Type Evaluation Technical Committee (NTETC) Measuring Sector:

Recommendation: Modify Section 1.10 Paragraph G-T.1. (e) Acceptance Tolerances as follows:

G-T.1. Acceptance Tolerances. - Acceptance tolerances shall apply to:

- (a) equipment to be put into commercial use for the first time;
- (b) equipment that has been placed in commercial service within the preceding 30 days and is being officially tested for the first time;
- (c) equipment that has been returned to commercial service following official rejection for failure to conform to performance requirements and is being officially tested for the first time within 30 days after corrective service;
- (d) equipment that is being officially tested for the first time within 30 days after major reconditioning or overhaul; and
- (e) equipment undergoing type evaluation (**special test tolerances are not applicable**).
(Amended 1989 **and 2005**)

Discussion/Background: At its October 2004 Meeting, the NTETC Measuring Sector noted that the intent of paragraph G-T.1. (e) is to specify that acceptance tolerances apply to all equipment undergoing type evaluation; however, the language is not clear regarding what tolerance would apply during “special tests.”

Special test tolerances recognize that a larger tolerance for test drafts conducted under certain conditions, such as at a slow flow rate, is appropriate for meters in normal service. Normal wear of the measuring elements frequently produces larger performance errors when testing at a slow flow rate, compared to testing at full flow rate. The Sector agreed that devices submitted for NTEP evaluation should be held to a higher standard than devices in normal service and special test tolerances should not be applicable during an NTEP evaluation. The Sector also agreed to forward the proposal to modify Handbook 44 paragraph G-T.1. (e) Acceptance Tolerances to the NCWM S&T Committee NCWM and Southern Weights and Measures Association for consideration.

At its October 2004 Meeting, the SWMA reviewed the recommendation and agreed to forward it to the Committee with the recommendation that it be a voting item on the 2005 NCWM S&T Agenda.

At the 2005 NCWM Interim Meeting, the Committee received no opposition to this item and, therefore, agreed to present it for a vote at the Annual Meeting.

At the 2005 NCWM Annual Meeting, members of the Meter Manufacturers Association (MMA) said that they had not understood that the proposal from the Measuring Sector would only apply to liquid measuring devices undergoing NTEP evaluation. They explained that without special test tolerances most meters, especially those installed in vehicle-mounted applications, would not meet tolerances for low flow tests during either field testing or NTEP evaluations. Based on this information the Committee agreed to make this an information item to allow the MMA and the Measuring Sector to further develop the proposal and submit it for reconsideration.

320 SCALES

320-1 I S.1.1. (c) Zero Indication; Requirements for Markings or Indications for Other than Digital Zero Indications

Source: Carryover Item 320-8. (This item originated from the Committee and first appeared on its 2004 agenda.)

Recommendation: Amend paragraph S.1.1. (c) as follows:

S.1.1. Zero Indication.

- (a) On a scale equipped with indicating or recording elements, provision shall be made to either indicate or record a zero-balance condition.

- (b) On an automatic-indicating scale or balance indicator, provision shall be made to indicate or record an out-of-balance condition on both sides of zero.
- (c) A zero-balance condition may be indicated by other than a continuous digital zero indication, provided that an effective automatic means is provided to inhibit a weighing operation or to return to a continuous digital indication when the scale is in an out-of-balance condition **and is marked or includes supplemental indications or markings to indicate that the “other than digital zero indication” represents a no-load condition of the scale.**
Added 1987 (Amended 1993 **and 2005**)

[Note: The markings or supplemental indications in S.1.1.(c) are not required if, prior to the start of a transaction: (1) operator intervention is required to verify the zero balance condition with a digital zero indication, or (2) the scale automatically represents the zero-balance condition with a digital zero indication.]
(Added 2005)

(Amended 1987)

Background/Discussion: The Committee proposes to modify paragraph S.1.1.(c) to clarify the requirement’s original intent for marking zero indications on scales and point-of-sale systems where a zero-balance condition is represented by other than a digital zero indication. The proposal is the Committee’s response to the 2003 NTETC Weighing Sector’s request for clarification on whether or not scales that use scrolling messages, dashes, etc., to indicate zero require additional markings or indications to: (1) inform customers that the scales are at a zero-balance condition and (2) properly identify the feature as specified in General Code paragraph G-S.6. Marking Operational Controls, Indications, and Features.

The proposal is consistent with other Handbook 44 code requirements adopted to ensure that customers have sufficient information to make an informed decision during a direct sale. These codes require marking and/or identification of values, graduations, units, and indications in the displayed and recorded transaction information. Handbook 44 includes requirements for clearly identifying operational controls and features used in weighing applications. Additionally, Handbook 44 requirements specify that the size, proximity, and position of that information shall be such that it is easily read and is appropriate for that application.

In 2003 the Weighing Sector reported there was ongoing disagreement among NIST Weights and Measures Division (WMD), the NTEP Participating Laboratories, and manufacturers regarding the interpretation of Handbook 44 General Code paragraph G-S.6. Marking Operational Controls, Indications, and Features; Scales Code paragraph S.1.1. Zero Indication; and related discussions in the 78th (1993) NCWM Specifications and Tolerances (S&T) Final Report Item 320-1 S.1.1. Zero Indication. These disagreements resulted in inconsistencies between type evaluations and field enforcement for scales and point-of-sale systems interfaced with scales that use methods such as screen savers, power savers, scrolling displays, and modes of operation other than a digital zero indication to indicate that a device is at a no-load condition. WMD and some representatives of several NTEP Participating Laboratories agreed that General Code paragraph G-S.6. requires weighing devices to be marked or provide an indication that states the zero-balance is represented by other than a digital zero indication. WMD and the representatives noted this interpretation was supported by the 1993 S&T Final Report, and NCWM Publication 14 clearly states such markings are required. Other Participating Laboratories and some manufacturers stated that the markings were not necessary because Handbook 44 paragraph S.1.1. (c) does not specifically state that the additional markings are required and the actions of the 78th NCWM to amend paragraph S.1.1.(c) provided sufficient customer protection for devices that use this feature.

Weights and measures officials indicated there may be “not-built-for-purpose” devices that do not comply with the proposed interpretation. These “not-built-for-purpose” devices are interfaced with approved devices; however, the system continues weighing when the scale is off zero. Consequently, officials questioned whether the proposed changes to paragraph S.1.1.(c) are intended to be nonretroactive requirements.

In July 2004 the Committee agreed that its proposal to modify paragraph S.1.1.(c) was consistent with the original intent of the requirement. After hearing comments about how some systems are designed to operate, the Committee decided that additional language was needed to clarify that no marking is required if operator intervention is

necessary to verify a zero condition before the start of a transaction. In July 2004, the Committee made this an information item to provide sufficient time for input from the Weighing Sector (that did not have this proposal at its 2003 meeting) and to receive a proposal that addresses operator intervention.

The Committee believes the proposal provides a record of how to apply the requirement. The Committee agreed that the original intent of the requirement was that all primary indicators comply with paragraph S.1.1., therefore, the proposal should be a retroactive requirement.

At its August 2004 meeting the Weighing Sector agreed with the Committee's interpretation, but did not find it necessary to modify paragraph S.1.1.(c) because NCWM Publication 14 was expanded in 2003 to include in type evaluation checklist procedures criteria to verify that digital electronic scales equipped with other than a continuous digital zero-balance indication comply. Publication 14 test procedures specify methods for defining the zero indication when the zero condition of the scale is represented by other than a continuous digital zero indication. The Weighing Sector agreed the type evaluation aspects of this issue have been resolved.

The Northeastern Weights and Measures Association (NEWMA) indicated there is little support for this proposal. Many at NEWMA believe the NTEP laboratories already have the necessary information to properly perform evaluations.

The Central and Western Weights and Measures Associations recommended the proposal be withdrawn because appropriate protections and labeling criteria are applied during type evaluation.

The Scale Manufacturers Association agreed that the current type evaluation process based on paragraph S.1.1.(c) prevents facilitation of fraud.

During the 2005 NCWM Interim Meeting, the Committee agreed that past inconsistencies in the interpretation of paragraph S.1.1.(c) warrant clarifying the intent of the paragraph in Handbook 44. Even though the regional weights and measures associations recommended a different approach, their positions do not disagree with the technical content of the proposal. The Committee further modified paragraph S.1.1. to include a new note recommended by WMD to clarify that no markings are necessary when operator intervention is required to return the indication to a digital zero balance before conducting a transaction.

At the July 2005 NCWM Annual Meeting, the Committee changed the status of the item from "voting" to "information" to allow additional time to determine whether or not the markings could be displayed as part of the indication rather than being physically marked on the device. This will also allow additional time for the Committee to gather information on whether or not self-service systems provide information about the zero-balance condition of scales prior to each weighing.

320-2 VC S.1.8.4. Recorded Representations, Point-of-Sale Systems; Footnote 1

(This item was adopted.)

Source: National Type Evaluation Technical Committee (NTETC) Weighing Sector

Recommendation: Amend paragraph S.1.8.4. Recorded Representations, Point-of-Sale Systems; Footnote 1 as follows:

S.1.8.4. Recorded Representations, Point-of-Sale Systems. - The sales information recorded by cash registers when interfaced with a weighing element shall contain the following information for items weighed at the checkout stand:

- (a) the net weight,¹
- (b) the unit price,¹

- (c) the total price, and
- (d) the product class or, in a system equipped with price look-up capability, the product name or code number.

~~¹Weight values shall be identified by kilogram, kg, grams, g, ounces, oz, pound, lb, or the sign “#.”~~ For devices interfaced with scales indicating in metric units, the unit price may be expressed in price per 100 grams. **Weight values shall be identified by kilogram, kg, grams, g, ounces, oz, pound, or lb. The “#” symbol is not acceptable.**
[Nonretroactive as of January 1, 2006]
(Amended 1995 **and 2005**)

Discussion/Background: In 1976, the Committee reviewed numerous examples of point-of-sale systems’ transaction information and provided clarification on how that information should be formatted on recorded representations. At that time, the Committee indicated the “#” symbol was an acceptable representation for “pound” on point-of sale system’s receipts. The Committee noted that the “#” symbol was acceptable because it was recognized in a widely used dictionary. In addition, printer technology at that time could better accommodate the “#” symbol since it required only one column, whereas the two characters in “lb” needed two columns.

Currently, NCWM Publication 14 “NTEP Technical Policy, Checklists and Test Procedures,” Section 75, List of Acceptable Abbreviations/Symbols recognizes the “#” symbol as acceptable, but discourages using the “#” symbol for recorded representations for electronic cash registers (ECR) and point-of-sale (POS) systems. One manufacturer reasoned that if the symbol is suitable for recorded representations for ECRs, then there is no justification for prohibiting use of the “#” symbol for other recorded representations or markings. The manufacturer argued that the “#” symbol should be acceptable in all instances or not acceptable in any weighing applications, but was amenable to the Weighing Sector’s proposal to remove the “#” symbol from Footnote 1.

The Committee considered several proposals to modify paragraph S.1.8.4. Footnote 1, including recommendations from the Western and Central Weights and Measures Associations outlined above and the Weighing Sector to remove reference to the “#” symbol as shown below:

~~¹Weight values shall be identified by kilogram, kg, grams, g, ounces, oz, pound, or lb, ~~or the sign “#.”~~~~ For devices interfaced with scales indicating in metric units, the unit price may be expressed in price per 100 grams. (Amended 1995 **and 200X**)

The Weighing Sector proposed removing the “#” symbol from paragraph S.1.8.4. Footnote 1 because the symbol represented a multitude of terms used in many unrelated disciplines and because of advances in printer technology. The Western, Central, Northeastern, and Southern Weights and Measures Associations and Scale Manufacturers Association agreed the “#” symbol is no longer acceptable, but this should not be applied retroactively.

At the 2005 NCWM Annual Meeting the Committee heard unanimous support for removing reference to “#” from the list of acceptable symbols used to identify weight values. The Committee agreed to present the proposal as a voting item with an effective date of January 1, 2006. This prohibition on the use of the “#” will be nonretroactive.

320-3 I UR.1.6. Computing Scale Interfaced to a Cash Register

Source: Southern Weights and Measures Association (SWMA)

Recommendation: Add a new paragraph UR.1.6. to the Scales Code as follows:

UR.1.6. Computing Scale Interfaced to a Cash Register. – A computing scale may interface with a cash register provided all displayed and recorded indications agree:

- (a) the cash register only records (serves as printer) the information received from the scale,**

(b) the computing scale has tare capability,

(c) the computing scale is not equipped with PLU capability,

(d) The electronic cash register does not have any input to the computing scale in the process of determining the total price of a weighed item.

(Added 200X)

Discussion: This proposal is intended to add new device-specific requirements to the Scales Code to address the interface of computing scales with electronic cash registers (ECR) and to clarify how each component must display transaction information. The requirements also prescribe how such devices must operate in taking tare and how Price-Look-Up (PLU) features must function. Currently, a General Code Specification (G-S.2.) specifying that weighing and measuring equipment and associated devices shall not facilitate fraud is not sufficient to clarify how a computing scale interfaced with an ECR must operate.

In Spring 2004, the NTEP Participating Laboratories learned that officials in one jurisdiction were finding computing scales interfaced with ECRs, where the ECR accepts weighing results from the computing scale and uses the ECR's price look-up (PLU) feature to retrieve tare and unit price information to calculate the total price. Officials reported that a different unit price, tare, and total price could be manually entered and displayed on the computing scale at the same time. In this instance, what the customer views on the computing scale as the net weight, unit price, and total price may not be what is actually used by the ECR to calculate the customer's charge. Additionally, the NTEP Certificate of Conformance (CC) for devices with such areas of noncompliance did not list the interface as an approved application.

The Participating Laboratories recognized that NCWM Publication 14 type evaluation criteria address how computing scales must interface with ECRs and decided to use that criteria to propose the following new specification for the Scales Code that would be used by field officials in their inspection and test of these systems:

S.1.8.5. Computing Scale Interfaced to a Cash Register. - A computing scale may interface with a cash register provided:

(a) the cash register only records (serves as printer) the information received from the scale,

(b) the computing scale has tare capability,

(c) the computing scale is not equipped with PLU capability, and

(d) the electronic cash register does not have any input to the computing scale in the process of determining the total price of a weighed item.

The proposal was distributed at the 2004 fall meetings of the NTETC Weighing Sector, Western Weights and Measures Associations (WWMA) and SWMA. The WWMA withdrew the item from its agenda because there was only minimal support for the proposal from the Weighing Sector. The Scale Manufacturers Association (SMA) opposed the proposed specification because SMA members believed it would, as worded, inadvertently impose design restrictions on devices. SMA recommended the following language as an alternative:

S.1.8.5. Computing Scale Interfaced to a Cash Register. - A computing scale may interface with a cash register provided all displayed and recorded indications agree.

The SWMA supported the original proposal because it provided clear guidance for officials and SWMA also believed it would be easier to enforce than G-S.2. Facilitation of Fraud. The SWMA agreed to forward the proposal to the NCWM S&T Committee for consideration as a voting item.

During the 2005 NCWM Interim Meeting, the Committee agreed that adding specific language to the Scales Code would make it easier for the field official to ensure that equipment is operating in an approved manner. The language clarifies that it is acceptable for the ECR and computing scale to communicate the total price, but not to the

point where the input process involves the ECR calculating the total price. The Committee recommended that jurisdictions, if they have not already done so, establish specific examination procedures (e.g., enter a new price per pound at the ECR) so that officials verify that both the ECR and the computing scale interface are in compliance.

The Committee heard numerous comments opposing the proposed specification. Industry representatives said the proposal might limit future technology used to interface equipment and that it would be too restrictive when applied to a point-of-sale system that reads UPC codes and computes prices for frequent shopper discounted prices. The Committee was advised that, since type evaluation already verifies the requirements proposed in new paragraphs S.1.8.5.(a) through (d), that the Committee should consider an alternate proposal that only specifies “all indications must agree,” similar to the language in the SMA proposal. The Committee also concluded that the term “input” should be expanded to more provide more detail to officials about how the interface must work and that a requirement was needed to ensure equipment in commercial use is interfaced as approved by NTEP and as intended by the manufacturer’s design. Consequently, the Committee modified the proposal to make it a user requirement with the recommendation that it be adopted by the NCWM.

During the 2005 NCWM Annual Meeting, the Committee again heard that there are instances in which a computing scale may be interfaced with an ECR to create a point-of-sale system that is contrary to the device application covered on the device’s Certificate of Conformance. Additionally, the Committee was told that neither of the proposals discussed above address computing scales with multiple sales accumulation capability. Several comments suggested that the current definition of point-of-sale system (POS) may also need modification to clarify the specific type of weighing element that is permitted as part of the POS assembly. Based on the comments it received the Committee believed that developing a new specification rather than a user requirement was the most appropriate way to address the problems that have been reported. Consequently, the Committee changed the item to “information” so that it can be further developed. The Committee recommends that the SWMA rework the proposal as a specification that (1) provides details to officials users about how cash registers must function, (2) provides guidance to assist device manufacturers who are considering design modifications to a computing scale or cash register, and (3) is not in conflict with requirements in related paragraphs such as S.1.8.4. Recorded Representations, Point-of-Sale Systems.

320-4 VC S.2.1.3. Scales Equipped with an Automatic Zero-Setting Mechanism (Zero Tracking), S.2.1.3.1. For Scales Manufactured Between January 1, 2007; Maximum Load Rezeroed, S.2.1.3.2. For Scales Manufactured On or After January 1, 2007; Maximum Load Rezeroed, and S.2.1.3.3. Automatic Zero-Setting Mechanism (Zero Tracking) on Class III L Devices
(This item was adopted.)

Source: National Type Evaluation Technical Committee (NTETC) Weighing Sector

Recommendation: Modify paragraphs S.2.1.3. and S.2.1.3.1. and add new paragraphs S.2.1.3.2. and S.2.1.3.3. as follows:

S.2.1.3. Scales Equipped with an Automatic Zero-Setting Mechanism (Zero Tracking). ~~—Under normal operating conditions—~~

S.2.1.3.1. Zero-Tracking for Scales manufactured Between January 1, 1981 and January 1, 2007. - The maximum load that can be “rezeroed,” when either placed on or removed from the platform all at once under normal operating conditions, shall be:

(a) for bench, counter, and livestock scales: 0.6 scale division;

(b) for vehicle, axle-load, and railway track scales: 3.0 scale divisions; and

(c) for all other scales: 1.0 scale division.

(Amended 2005)

S.2.1.3.2. Zero-Tracking for Scales manufactured On or After January 1, 2007. - The maximum load that can be “rezeroed,” when either placed on or removed from the platform all at once under normal operating conditions, shall be:

(a) for vehicle, axle-load, and railway track scales: 3.0 scale divisions; and

(b) for all other scales: 0.5 scale division.

(Added 2005)

S.2.1.3.13. Automatic Zero-Setting Mechanism Means to Disable Zero-Tracking on Class III L Devices - Class III L devices equipped with automatic zero setting mechanisms shall be designed with a sealable means to allow the automatic zero setting to be disabled during the inspection and test of the device.

[Nonretroactive as of January 1, 2001]

(Added 1999) **(Amended 2005)**

Discussion: This issue revisits the 2003 Weighing Sector’s concerns about holding a device to different AZSM requirements based solely on whether or not it is located on a counter or floor. The confusion over how to apply AZSM requirements is compounded when a family of scales covered on an NTEP Certificate of Conformance includes both bench/counter scales and other platform-type scales. Currently, paragraph S.2.1.3. specifies a different maximum load that can be rezeroed under normal operating conditions for bench/counter scales (0.6 scale division) from that for all other scales (1.0 scale division).

The proposal is also intended to partially align the automatic zero tracking requirements in paragraph S.2.1.3. with those of Measurement Canada and OIML R76 “Non-automatic Weighing Instruments.” AZSM requirements for Class III L vehicle, axle-load, and railway track scales will remain unchanged.

The Weighing Sector asked that the proposal be a developing item on the NCWM S&T Agenda while the regional weights and measures associations consider its effect on field evaluations. The Sector’s public members questioned how field officials will determine the date of manufacture and whether training is needed. The Weighing Sector’s industry members requested a delayed enforcement date to allow sufficient time for changes to be made to devices nearing the end of their production cycle.

The Western Weights and Measures Association (WWMA) believed there is sufficient time between September 2004 and July 2005 to gather data to determine if there will be enforcement issues. The WWMA agreed that while input from field officials is necessary the proposal should move forward as a voting item.

The Central Weights and Measures Association received no comments on the proposal and recommended it move forward as a voting item.

The Southern Weights and Measures Association agreed with the concern stated by public members of the Sector that it is difficult for field officials to determine when a device was manufactured and recommended the proposal be an information item.

NIST Weights and Measures Division (WMD) believes field officials will have no difficulty with enforcing the proposal based on the equipment manufacture date since officials already successfully establish that criteria when enforcing other nonretroactive requirements.

The Scale Manufacturers Association (SMA) believes the proposal has no technical merit and is only an attempt to harmonize United States and OIML requirements. SMA is concerned about the potential for unnecessarily increasing evaluation costs. However, the SMA supported this effort toward harmonization provided NTEP does not require reevaluation of devices already covered by NTEP Certificates of Conformance.

At the 2005 NCWM Interim Meeting, the Committee agreed that the proposal is a good move in the direction of harmonization of standards and should not lose momentum. The Committee concluded that sufficient data could be easily gathered by July 2005 on new production lots of existing products to demonstrate if a January 1, 2006,

effective date was appropriate. The Committee encouraged manufacturers, officials, and Participating NTEP Laboratories to gather data since it is easy for each group to verify if bench, counter, livestock scales, and scales classified as other types can meet the proposed ASZM requirement during their regular duties. The Committee indicated it is willing to modify the date to January 1, 2007, if any group submitted data at the July 2005 NCWM Annual Meeting to support extending the period in which manufacturers have to comply. The Committee agreed with WMD's assessment that jurisdictions continually prove their ability to determine manufacture dates when devices are subject to nonretroactive requirements. The Committee indicated its full support of an NTEP policy that does not require additional evaluation for existing equipment since the proposal appears to have little effect on most bench or counter scales. Consequently, the Committee agreed the proposal was ready for a vote at the 2005 NCWM Annual Meeting.

During the July 2005 NCWM Annual Meeting, the Committee acknowledged that officials may experience delays during inspections if they have to verify the date that a device was manufactured. However, it believes these delays are manageable and are no different than those experienced when verifying compliance with other nonretroactive requirements. Typically, date of manufacture information is readily available from the manufacturer. The Committee heard opposition to an alternate SMA proposal that based the enforcement date on the Certificate of Conformance (CC) issue date. A CC can be updated or revised for any number of reasons consequently there are variations in subsequent CC numbers and model features that would require even more investigative work by officials. The Committee did not support the alternate proposal since it would also set a precedent for enforcing Handbook 44 nonretroactive requirements based on the CC issue date rather than the manufacture date. The Committee also recognized that there may be some models nearing the end of their production life, where it may not be economically practicable to modify them to meet the proposed maximum 0.5 d load requirement. The Committee heard from industry that most equipment is already designed to operate to the proposed standard and that large numbers of devices are not built in advance; however, additional time is necessary for existing field devices to reach the end of their life cycle. Consequently, the Committee modified the proposal to extend the enforcement date to January 1, 2007.

320-5 VC Table S.6.3.b. Notes For Table S.6.3.a. Note 3; Nominal Capacity and Value of the Scale Division and Appendix D; Definition of Reading Face
(This item was adopted.)

Source: National Type Evaluation Technical Committee (NTETC) Weighing Sector

Recommendation: Amend Table S.6.3.b. Notes For Table S.6.3.a. Note 3 and revise the definition for "reading face" to include a reference to Scales Code Section 2.20 as follows:

3. **The device shall be marked with the nominal capacity.** The nominal capacity ~~and shall be shown together with the~~ value of the scale division (e.g., ~~50 000 x 5 kg, 100 000 x 10 lb, 15 x 0.005 kg, or 30 x 0.01 lb, or capacity = 15 kg, d = 0.005 kg~~) **adjacent to the weight display in a clear and conspicuous manner and be readily apparent when viewing the reading face of the scale indicator unless when the nominal capacity and value of the scale division are not immediately already apparent by the design of the device.** Each scale division value or weight unit shall be marked on multiple range or multi-interval scales.

[Nonretroactive as of January 1, 1983]

(Amended 2005)

reading face. That portion of an automatic-indicating weighing or measuring device that gives a visible indication of the quantity weighed or measured. A reading face may include an indicator and a series of graduations or may present values digitally, and may also provide money-value indications. [1.10, **2.20**]

(Amended 2005)

Discussion: The proposed change is intended to eliminate any differences in the interpretation of where to place the required nominal capacity and scale division markings on equipment. Currently, Table S.6.3.b. Note 3 specifies that the nominal capacity and the scale division shall be shown together adjacent to the weight display. In 1990, the Committee was unable to arrive at definitive guidelines on what is meant by "adjacent" and left the interpretation to

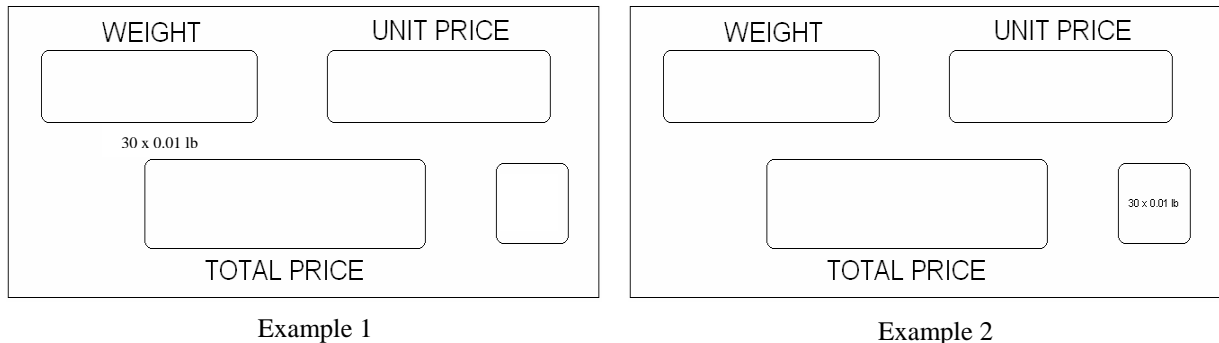
NTEP Participating Laboratories. Any manufacturer's challenge to the laboratory's interpretation was to be heard by the NTEP Board of Governors (now the NCWM NTEP Committee).

NCWM Publication 14, "NTEP Technical Policy, Checklists, and Test Procedures" for Digital Electronic Scales Section 2.13. states:

2.13. The nominal capacity by minimum scale division shall be clearly and conspicuously marked adjacent to the weight display. (Acceptable location depends on conspicuousness).

Repeated attempts by the NTEP Laboratories and manufacturers to uniformly apply this marking requirement have resulted in conflicting interpretations. The NTEP Laboratories believe the criteria in paragraph 2.13. implies that "conspicuousness" should be the primary objective, rather than proximity of the information. However, the NTEP Laboratories agree that until the term "adjacent" is removed from Handbook 44 Table S.6.3.b. Note 3, the Laboratories are tied to requiring the nominal capacity and scale division values be marked adjacent to the weight display as shown below in Example 1.

The NTEP Laboratories maintain that the information must be marked next to the weight display on the face of a scale, as shown below in Example 1, but that they continue to receive devices with the required markings located elsewhere on the face of the scale such as shown below in Example 2.



The NTEP Laboratories agreed that at this point in time Example 2 shown above is incorrect according to Handbook 44 because the markings do not appear adjacent to or as close as practical to the weight display as required in General Code paragraph G-S.5.2.4. Values. The NTEP Laboratories believe that the operator is already familiar with the device and the customer does not fully understand the significance of this information. The NTEP Laboratories also believe that the markings in the examples above are "conspicuous" enough for the inspector and service technician who rely most heavily on the information. However, Example 2 is only acceptable if Note 3 could be amended to allow for placing the markings conspicuously on the face of the indicating portion of the scale.

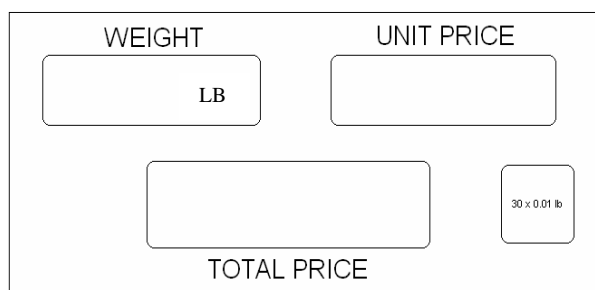
The Weighing Sector agreed with the Laboratories that both Example 1 and 2 represent the acceptable placement of markings since they are either adjacent to or conspicuous on the reading face of the weight display. The Weighing Sector also proposed to modify the existing definition of "reading face" to include a reference to Section 2.20. Scales Code since the term would also apply to scale indications.

The Central Weights and Measures Association and Scale Manufacturers Association (SMA) supported the Sector's proposal shown in the recommendation above. The Scale Manufacturers Association asked for further clarification on the meaning of the phrase "already apparent by the design."

The Western Weights and Measures Association (WWMA) discussed how paragraph G-S.5.2.4. requirements for values are not intended to apply to the nominal capacity statement and do little to help the customer determine the acceptability of a weight value. The WWMA agreed to the same wording shown in the Weighing Sector's proposal and recommended the proposal move forward as a voting item.

The Northeastern Weights and Measures Association concluded that this is an NTEP issue and “adjacent” is the correct terminology since it represents “abutting” or “next to.”

The Southern Weights and Measures Association (SWMA) agreed with the Weighing Sector’s proposal provided the unit of weight is identified in a manner that is consistent with requirements in paragraph G-S.5.2.4. Values for placing, as close as practicable, adequate and sufficient information to define graduations, indications, or recorded representations. The SWMA agreed that Example 2 is not correct; however, the placement of the nominal capacity and division marking would be correct if the unit of weight were properly marked adjacent to the weight display shown in Example 3.



Example 3

The NIST Technical Advisor to the Weighing Sector requested that the Sector consider an alternate NIST Weights and Measures Division (WMD) proposal amending Note 3 in Table S.6.3.b. to require markings “near” the weight display that do not reference the reading face as follows:

3. *The nominal capacity and value of the scale division shall be shown together (e.g., ~~50 000 x 5 kg~~, ~~100 000 x 10 lb~~, 15 x 0.005 kg , or 30 x 0.01 lb) near adjacent to the weight display when the nominal capacity and value of the scale division are not immediately apparent. Each scale division value or weight unit shall be marked on multiple range or multi-interval scales.*
[Nonretroactive as of January 1, 1983]
(Amended 200X)

The WMD proposal would also more closely align U.S. terminology with that used in OIML R76 “Non-automatic Weighing Instruments” paragraph 7.1.4 Presentation of descriptive markings, which specifies the descriptive markings shall be grouped together shall identify the Max, Min, e, and d, if “d” does not equal “e”, and shall be shown near the display of the weight result if they are not already located there.

WMD was concerned that the Sector’s proposal deviates from the intent of General Code paragraph G-S.5.2.4. Values, which specifies that values shall be adequately defined and placed as close as practicable to the corresponding indication. WMD noted the Sector’s proposal allows information to be placed further away from the display and this becomes more difficult to locate as the font size of the lettering decreases. WMD disagreed with the premise that consumers do not value this information. WMD believes the information should be available to the customer as well as officials and service representatives. As currently written, Note 3 is not in conflict with the General Code paragraph G-S.5.2.4. Values. However, the proposal creates a conflict since it would permit markings that may not be placed as close as practical to the weight display.

The Committee agreed that the Sector’s proposal shown above is acceptable and ready for a vote since it provides guidelines on the required information, yet allows some flexibility in the placement of that information. The Committee concurred with officials that the phrase “already apparent by the design” is a carryover from language developed to address mechanical beam and dial type scales, where the beam capacity and its “d” and the complete revolution of the dial and its “d” provided the nominal capacity and value of the scale division without the need for additional markings. The Committee concluded that Example 1 and Example 3 both comply with the proposal and show acceptable ways to mark the nominal capacity and value of the scale division (d) even though there is a

difference in where the information is placed on the display. Example 2 is not encouraged since it is the conspicuous supplemental marking of “LB” on the weight display that makes all of the information crystal clear.

During the July 2005 NCWM Annual Meeting, the Committee modified the proposal to also recognize formats used in international markings to designate the capacity and d, such as “max = 15 kg, d = 0.005 kg, where text or abbreviations may identify the required capacity and division size information. Marking the capacity and division information in the alternate format also requires that the information is located near the weight display.

320-6 I N.1.3.1. Bench or Counter Scales, N.1.3.8. All Other Scales Except Crane Scales, Hanging Scales, Hopper Scales, Wheel-Load Weighers, and Portable Axle-Load Weighers, and Appendix D; Definitions of Bench Scale and Counter Scale

Source: National Type Evaluation Technical Committee (NTETC) Weighing Sector

Recommendation: Delete paragraph N.1.3.1. and renumber subsequent paragraphs.

N.1.3. Shift Test.

~~**N.1.3.1. Bench or Counter Scales. — A shift test shall be conducted with a half-capacity test load centered successively at four points equidistant between the center and the front, left, back, and right edges of the load-receiving element.**~~

Renumber and amend paragraph N.1.3.8. All Other Scales Except Crane Scales, Hanging Scales, Hopper Scales, Wheel-Load Weighers, and Portable Axle-Load Weighers as follows:

N.1.3.87. All Other Scales Except Crane Scales, Hanging Scales, Hopper Scales, Wheel-Load Weighers, and Portable Axle-Load Weighers. A shift test shall be conducted using the following prescribed test loads and test patterns.

(a) For livestock scales, the with a nominal capacity greater than 150 kg (300 lb), a shift test load shall not exceed one-half the rated section may be conducted by either using one-third nominal capacity or one-half the rated concentrated load test load centered as nearly as possible at the center of each quadrant of the load-receiving element as shown in Figure 1 below, or by using one-quarter nominal capacity, whichever is applicable. A shift test shall be conducted using either: load centered as nearly as possible, successively over each corner of the load-receiving element as shown in Figure 2 below.

(ab) A one-quarter For scales with a nominal capacity of 150 kg (300 lb) or less, a shift test load shall be conducted using one-third nominal capacity test load. The centered as nearly as possible, successively over each main load shall be applied centrally in the quadrant if a single weight is used, or applied uniformly over the quadrant, if several weights are used, support as shown in the diagram below; or

(bc) A one-half nominal capacity For livestock scales, the shift test load centered as nearly as possible, successively at the center of each quarter of the load-receiving element shall not exceed one-half the rated section or concentrated load capacity using the prescribed test pattern as shown in the diagram Figure 1, or one quarter the section or concentrated load capacity as shown in Figure 2 below.

(Added 2003)

(Amended 1987, and 2003, and 200X)

Figure 1

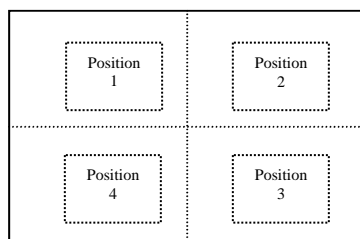
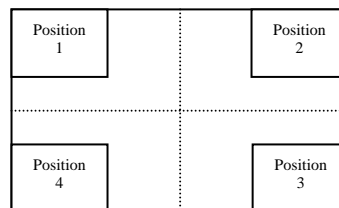


Figure 2



Delete Appendix D definitions for “bench scale” and “counter scale” as follows:

~~bench scale. See “counter scale.”[2.20]~~

~~counter scale. One that, by reason of its size, arrangement of parts, and moderate nominal capacity, is adapted for use on a counter or bench. Sometimes called “bench scale.”[2.20]~~

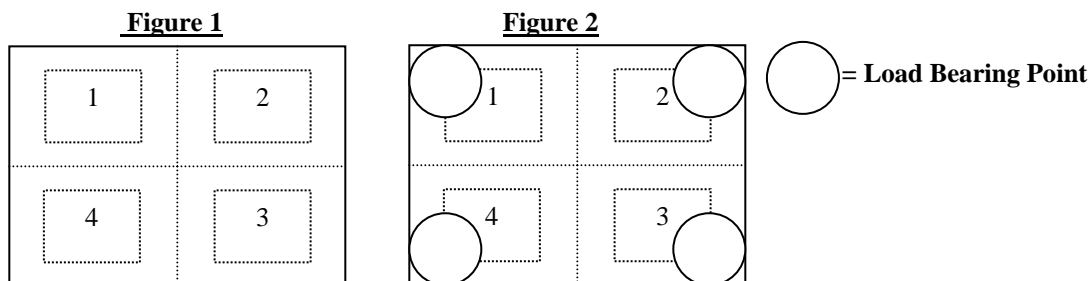
The Central Weights and Measures Association (CWMA) recommended an alternate proposal to modify paragraph N.1.3.8. as follows:

N.1.3.87. All Other Scales Except Crane Scales, Hanging Scales, Hopper Scales, Wheel-Load Weighers, and Portable Axle-Load Weighers. A shift test shall be conducted using the following prescribed test loads and test patterns.

- (a) ~~For livestock scales, the~~ with a nominal capacity greater than 150 kg (300 lb) a shift test load shall not exceed one-half the rated section may be conducted by either using one-third nominal capacity or one-half the rated concentrated load test load centered as nearly as possible at the center of each quarter of the load-receiving element as shown in Figure 1 below, or by using one-quarter nominal capacity, whichever is applicable. A shift test shall be conducted using either: load centered as nearly as possible, successively over each corner of the load-receiving element as shown in Figure 2 below.
- (ab) ~~A one-quarter~~ For scales with a nominal capacity of 150 kg (300 lb) or less, a shift test load shall be conducted using one-third nominal capacity test load. The centered as nearly as possible, successively over each main load shall be applied centrally in the segment if a single weight is used, or applied uniformly over the segment, if several small weights are used support as shown in the diagram-Figure 1 below; or,
- (bc) ~~A one-half nominal capacity~~ For livestock scales the shift test load centered as nearly as possible, successively at the center of each quarter of the load-receiving element shall not exceed one-half the rated section or concentrated load capacity using the prescribed test pattern as shown in the diagram Figure 1, or one-quarter of the section or concentrated load capacity as shown in Figure 2 below.

(Added 2003)

(Amended 1987, ~~and~~ 2003, and 200X)



Discussion: The Committee was requested to reconsider a 2003 Weighing Sector proposal to clarify the appropriate shift test pattern and test loads for bench/counter scales and other platform-type scales. Currently, bench and counter scale shift tests are conducted with a one-half capacity test load centered successively at four points equidistant between the center and the front, left, back, right edges of the load-receiving element. Other platform scale shift tests are conducted with a one-half capacity test load centered, as nearly as possible, successively at the center of each quadrant. The proposal eliminates the bench and counter scale device types and prescribes the shift test load and test pattern based on either the scale's nominal capacity or because the scale is used to weigh livestock. It should be noted that the proposal does not permit corner testing for scales with a nominal capacity less than or equal to 150 kg. Corner testing is allowed within permissible load limits if the scale has four load supports for scales with a nominal capacity greater than 150 kg. Currently, Table 4 Minimum Test Weights requires that scales with a capacity of 150 kg or less have test weights up to 100 % of the scale capacity.

The Scale Manufacturers Association (SMA) supported the Sector's proposal, but pointed out that Figure 2 was inconsistent with the proposed requirement that describes the location of the test load. Consequently, the SMA recommended an alternate Figure 2, where the test loads were located on the outer corners of the platform. The SMA also noted other inconsistencies in the terminology in the proposal. Proposed paragraph N.1.3.7.(a) included the term "quarter," whereas proposed paragraph N.1.3.7.(b) specified the term "segment." The SMA recommended replacing both terms with the word "quadrant."

The SMA agreed that the Sector's proposal provided for a shift test that is independent of the device's design. The proposal is an improvement over the corresponding R76 requirement, which is design dependent. In keeping with the spirit of harmonization, the SMA recommended that NIST Weights and Measures Division (WMD) submit a similar proposal to OIML.

The Committee heard similar comments from all regional weights and measures associations indicating that additional study is needed before presenting the issue for a vote. The associations indicated that additional data should be collected on shift tests to verify that the proposed test loads and positions are equivalent to existing test loads. On a general note regarding harmonization with OIML, the Northeastern Weights and Measures Association believes there may be instances where OIML should harmonize with U.S. requirements. Participants at the regional meetings were advised that all shift test data comparing existing and proposed test loads and positions should be sent to Steve Cook, NIST Technical Advisor to the NTETC Weighing Sector, at steven.cook@nist.gov, by fax at 301-926-0647 or at NIST WMD, 100 Bureau Drive MS 2600, Gaithersburg, MD 20899-2600.

The Committee made the proposal an information item to allow sufficient time for comparison of data using existing and the proposed shift test procedures to ensure that devices passing current tests also meet the proposed requirements. The Committee acknowledged that the Weighing Sector proposal addressed the Committee's 2004 requests for a procedure where the official was not required to determine the scale's design in order to conduct a shift test. In the spring of 2005, the proposal was posted on the Weights and Measures List Server to generate further discussion and data. The Committee agreed that the corrections noted by SMA to the Figure 2 diagram and terminology were appropriate and, therefore, modified the proposals accordingly.

During the July 2005 NCWM Annual Meeting, the Committee further modified Figure 2 by showing the test loads as squares because circles are used in other sections of Handbook 44 to represent load bearing points. The Committee kept the proposal as an information item to enable officials and the NTEP Laboratories to continue forwarding data on the proposed and current shift tests to the NIST Technical Advisor for evaluation.

320-7 I Table 6 Tolerances

Source: NIST Weights and Measures Division (WMD)

Recommendation: Amend Table 6 Maintenance Tolerances as follows:

Table 6. Maintenance Tolerances (All values in this table are in verification scale divisions e)				
Tolerance in <u>verification</u> scale divisions e				
Class	1	2	3	5
Test Load				
I	0 - 50 000	50 001 - 200 000	200 001 +	
II	0 - 5 000	5 001 - 20 000	20 001 +	
III	0 - 500	501 - 2 000	2 001+ - 4 000	4 001 +
IIII	0 - 50	51 - 200	201+ - 400	401 +
III L	0 - 500	501 - 1 000	(Add 1 de for each additional 500 de or fraction thereof)	

(Amended 200X)

Discussion: During an August 2003 meeting, the U.S. National Work Group (USNWG) for R76 “Non-automatic Weighing Instruments” discussed the differences in the tolerances for Class III and IIII weighing instruments. The USNWG reconfirmed that the original intent of the step tolerances was to provide a relationship between scale accuracy and scale resolution. The USNWG agreed that NIST Handbook 44 Class III and Class IIII tolerances should be aligned with OIML R76. The manufacturers present reported that they build identically performing instruments and load cells for both U.S. and international markets.

In September 2004 Hobart Corporation provided “production data” comparing different Class III tolerances. Hobart’s data demonstrated that their production scales would comply with Handbook 44 Table 6 tolerances up to 10 000 e and OIML R76 tolerances up to approximately 7000 e. Hobart also reported that many scales and load cells with an n_{\max} greater than 5000 e would have difficulty in complying with the temperature effect on zero in both Handbook 44 and OIML R76 standards. Currently, a scale’s performance takes advantage of the extra step in Handbook 44, and that is contrary to the intended relationship of scale resolution to accuracy.

The NIST technical advisor to the Weighing Sector requested that it discuss whether or not there is any need to retain the Handbook 44 Accuracy Class III L tolerance or for proposing this tolerance be incorporated into OIML R76. The Class III L tolerance structure in Handbook 44 deviates from the intent of step tolerances since there is little relation of the value of the scale division (i.e., $e = 20$ lb resolution) to the accuracy required (i.e., $\pm 8 e$ at 80 000 lb maintenance tolerance). It should be noted that the tolerance values, zero-tracking limit, and motion detection requirements in Handbook 44 are roughly equivalent to an R76 instrument when $e = 50$ lb.

The NTETC Weighing Sector withdrew this proposal from its agenda since it was not developed in response to problems encountered with Publication 14 test procedures and, hence, not under its purview. The Sector recommended the WMD and USNWG proposal become either an information item or developing item that is reviewed by the regional weights and measures associations as well as the NCWM S&T Committee. Several regional associations recommended that more data is needed before the proposal can move to a vote.

Additional test data is needed to determine the effect of the proposed tolerances on Class III and IIII scales and on the apportionment of errors for single and multiple load cell applications. It is also recommended that consideration be given to the international recommendations for the apportionment of error and that further analysis be made on the proposal’s possible impact on load cells, separable weighing elements, and existing scales. One regional association noted that the Class III L scale tolerances for test loads greater than the proposed 1000 verification scale

divisions (e) are based on a test load value measured in scale divisions (d) rather than the proposed “e.” That association questioned whether these tolerances should be in “e;” however, it recognized that further modification may only add to the confusion.

During the 2005 NCWM Interim Meeting, the Committee agreed that the proposal has merit. However, it made the proposal an information item in response to requests for more time to examine data from test results using the proposed tolerances and to determine if there are devices that cannot comply, unless they are granted the 5 d tolerance being eliminated from Table 6. The Committee also modified the Class III L tolerance structure for test loads greater than 1000 e to include units of “e” rather than “d” since it is appropriate to have like units in Table 6.

During the 2005 NCWM Annual Meeting, the Scale Manufacturers Association (SMA) reiterated its opposition to the proposal because it believes a change of this magnitude is premature and should not take precedence over other harmonization issues.

320-8 V T.N.4.5. Time Dependence, General, T.N.4.5.1. Time Dependence; Class II, III, and IIII Non-automatic Weighing Instruments, T.N.4.5.2. Time Dependence; Class III L Non-automatic Weighing Instruments, T.N.4.6. Time Dependence (Creep) for Load Cells During Type Evaluation, T.N.4.6.1. Permissible Variations of Readings, T.N.4.6.2. Apportionment Factors, and Definitions of D_{\max} , E_{\max} , and Non-automatic Weighing Instrument
(This item was adopted.)

Source: Western Weights and Measures Association (WWMA)

Recommendation: Amend paragraph T.N.4.5. as follows:

T.N.4.5. Time Dependence, General. - ~~At constant test conditions, the indication 20 seconds after the application of a load and the indication after 1 hour shall not differ by more than:~~ A time dependence test shall be conducted during type evaluation and may be conducted during field verification provided test conditions remain constant.

(a) ~~one-half of the absolute value of the applicable tolerance for the applied load for class III L devices; and~~

(b) ~~the absolute value of the applicable tolerance for the applied load for all other devices.~~
(Amended 1989 and 2005)

Add new paragraphs T.N.4.5.1. and T.N.4.5.2. as follows:

T.N.4.5.1. Time Dependence; Class II, III, and IIII Non-automatic Weighing Instruments. - A non-automatic weighing instrument of class II, III, and IIII shall meet the following requirements at constant test conditions:

(a) When any load is kept on an instrument, the difference between the indication obtained immediately after placing a load and the indication observed during the following 30 minutes shall not exceed 0.5 e.

(b) However, the difference between the indication obtained at 15 minutes and that at 30 minutes shall not exceed 0.2 e. If these conditions are not met, the difference between the indication obtained immediately after placing a load on the instrument and the indication observed during the following four hours shall not exceed the absolute value of the maximum permissible error at the load applied.

(c) The deviation on returning to zero as soon as the indication has stabilized, after the removal of any load which has remained on the instrument for 30 minutes, shall not exceed 0.5 e.

For a multi-interval instrument, the deviation shall not exceed 0.5 e_1 (first weighing segment).

On a multiple range instrument, the deviation on returning to zero from Max_i (load in the applicable weighing range) shall not exceed $0.5 e_i$ (interval of the weighing segment). Furthermore, after returning to zero from any load greater than Max_1 (capacity of the first weighing range) and immediately after switching to the lowest weighing range, the indication near zero shall not vary by more than e_1 (interval of the first weighing range) during the following 5 minutes.

(Added 2005)

T.N.4.5.2. Time Dependence; Class III L Non-automatic Weighing Instruments. - A non-automatic weighing instrument of class III L shall meet the following requirements:

- (a) When any load is kept on an instrument, the difference between the indication obtained immediately after placing a load and the indication observed during the following 30 minutes shall not exceed $1.5 e$.
- (b) However, the difference between the indication obtained at 15 minutes and that at 30 minutes shall not exceed $0.6 e$. If these conditions are not met, the difference between the indication obtained immediately after placing a load on the instrument and the indication observed during the following 4 hours shall not exceed the absolute value of the maximum permissible error at the load applied.
- (c) The deviation on returning to zero as soon as the indication has stabilized, after the removal of any load which has remained on the instrument for 30 minutes, shall not exceed one-half of the absolute value of the applicable tolerance for the applied load for class III L devices.

(Added 2005)

Add new paragraphs T.N.4.6., T.N.4.6.1., T.N.4.6.2., T.N.4.6.3 and Table T.N.4.6.2 to include tolerances for load performance and zero repeatability that are aligned with OIML R 60.

T.N.4.6. Time Dependence (Creep) for Load Cells During Type Evaluation. - A load cell (force transducer) marked with an accuracy Class shall meet the following requirements at constant test conditions:

- (a) Permissible Variations of Readings. - With a constant maximum load for the measuring range, (D_{max}) between 90 % and 100 % of maximum capacity (E_{max}) applied to the load cell, the difference between the initial reading and any reading obtained during the next 30 minutes shall not exceed the absolute value of the maximum permissible error (mpe) for the applied load (see Table T.N.4.6.). The difference between the reading obtained at 20 minutes and the reading obtained at 30 minutes shall not exceed 0.15 times the absolute value of the mpe (see Table T.N.4.6.).
- (b) Apportionment Factors. - The mpe for creep shall be determined from Table T.N.4.6. Maximum Permissible Error (mpe)* for Load Cells using the following apportionment factors (p_{LC}):

$p_{LC} = 0.7$ for load cells marked with S (single load cell applications), and
 $p_{LC} = 1.0$ for load cells marked with M (multiple load cell applications)

(Added 2005)

Table T.N.4.6.
Maximum Permissible Error (mpe)* for Load Cells
During Type Evaluation

mpe in Load Cell Verifications Divisions (v) = $p_{LC} \times$ Basic Tolerance in v			
Class	$p_{LC} \times 0.5 v$	$p_{LC} \times 1.0 v$	$p_{LC} \times 1.5 v$
I	0 - 50 000 v	50 001 v - 200 000 v	200 001 v +
II	0 - 5 000 v	5 001 v - 20 000 v	20 001 v +
III	0 - 500 v	501 v - 2 000 v	2 001 v +
III	0 - 50 v	51 v - 200 v	201 v +
III L	0 - 500 v	501 v - 1 000 v	(Add 0.5 v to the basic tolerance for each additional 500 v or fraction thereof up to a maximum load of 10 000 v)

v represents the load cell verification interval
 p_{LC} represents the apportionment factors applied to the basic tolerance
 $p_{LC} = 0.7$ for load cells marked with S (single load cell applications)
 $p_{LC} = 1.0$ for load cells marked with M (multiple load cell applications)
*** mpe = $p_{LC} \times$ Basic Tolerance in load cell verifications divisions (v)**

(Table Added 2005)

Add new definitions of D_{max} , E_{max} , and amend the current definition of non-automatic weighing systems as follows:

D_{max} (maximum load of the measuring range). Largest value of a quantity (mass) which is applied to a load cell during test or use. This value shall not be greater than E_{max} . [2.20]

E_{max} (maximum capacity). Largest value of a quantity (mass) which may be applied to a load cell without exceeding the mpe. [2.20]

non-automatic weighing system instrument. A weighing instrument or system that requires the intervention of an operator during the weighing process to determine the weighing result or to decide that it is acceptable. [2.20, 2.24]

Notes: Determining the weighing result includes any intelligent action of the operator that affects the result, such as deciding and taking an action when an indication is stable or adjusting the weight of the weighed load.

Deciding that the weighing result is acceptable means making a decision regarding the acceptance of each weighing result on observing the indication or releasing a print out. The weighing process allows the operator to take an action which influences the weighing result in the case where the weighing result is not acceptable.

(Added 2004) **(Amended 2005)**

Background/Discussion: The NIST Weights and Measures Division believes that this recommendation is a small step in the work to align U.S. and international requirements. Another possible alternative for aligning Handbook 44 and Publication 14 with OIML R60 "Load Cells" is to consider incorporating OIML R60 chapters 1 through 7 by reference into Handbook 44 and OIML R60 Annexes A through E into Publication 14. Handbook 44 and Publication 14 could further include paragraphs that state which requirements are not adopted, are different than, or are in addition to OIML R60.

The following background information on the development of Handbook 44 Scales Code paragraph T.N.4.5. Time Dependence is provided by Mr. John Elengo (NIST Consultant), who prepared the comparison of Handbook 44, OIML R76 "Non-automatic Weighing Instruments," and OIML R60.

Prior to the adoption of Handbook 44 paragraph T.N.4.5., the United States had not established any requirements for “creep.” At that time, the OIML requirement for a creep test was based on a 4-hour period, which was considered excessive since the error is primarily contributed by the load cells used in a scale. Generally, the greatest amount of load cell creep occurs during a short period (minutes) immediately following the application of the load on the scale. After that point, the output becomes increasingly constant. Hence, the United States adopted a requirement that specifies a 1-hour period rather than a 4-hour period. Years later, during the revision of OIML R60, it became evident that most international evaluation laboratories were not conducting the 4-hour test but a shorter one, and the creep proved to stabilize sufficiently during this shorter test. The assumption was made that a device passing the shorter test would meet the 4-hour requirement. This assumption was verified by sample tests. Based on this experience and that gained in the international comparison of load cell evaluations, the OIML International Work Group for R60 concluded that a 30-minute test is sufficient provided that, in addition to measuring the difference over a 30-minute period, the difference occurring in the last 10 minutes of this period is also measured. A more restrictive allowance than the total allowance for the 30-minute period is applied to the 10-minute period difference in order to assure that the creep is becoming increasingly constant and not increasing. The R60 30-minute requirement has been incorporated into OIML R76. Thus, the requirement now applies not only to the load cell, but also to the instrument as a whole. If main components other than the load cell are a source of creep, they can be accounted for using the principle of apportionment of errors (including the assignment of fractions “ p_i ” to those various separate main components of an instrument that can be evaluated separately). [Refer to R76-1 Section 3 Metrological Requirements paragraph 3.5.4. Apportioning of Errors.]

The NTEP Laboratories discussed this at the 2004 NTEP Participating Laboratories meeting and agreed to forward a proposal to align Handbook 44 with R76 and R60 to the Committee.

The National Type Evaluation Technical Committee (NTETC) Weighing Sector withdrew this proposal from its agenda since it was not developed in response to problems with Publication 14 test procedures (and, hence, not under its purview) and due to time constraints. A member of the Weighing Sector also noted that the proposal does not recognize tolerances for Class I scales.

The Western Weights and Measures Association recommended this item move forward as a voting item, but did not indicate its rationale for taking this position.

The Central Weights and Measures Association (CWMA) agreed the proposal was an issue for the Weighing Sector requiring further development. Consequently, CWMA recommended the proposal move forward as an information item.

The Northeastern Weights and Measures Association (NEWMA) recommended that for consistency the U.S. terms should be followed by the OIML equivalent terminology in parentheses. NEWMA also found that this is an example of the need for revising Handbook 44 into separate sections for field verification and type evaluation test procedures.

The Southern Weights and Measures Association recommended that the proposal become a developing item on the NCWM S&T Agenda.

The Scale Manufacturers Association (SMA) recommended only the proposed modification to current Scales Code paragraph T.N.4.5. as follows:

T.N.4.5. Time Dependence, General. - ~~At constant test conditions, the indication 20 seconds after the application of a load and the indication after 1 hour shall not differ by more than:~~ A time dependence test shall be conducted during type evaluation.

(a) ~~one half of the absolute value of the applicable tolerance for the applied load for class III L devices;~~
~~and~~

(b) ~~the absolute value of the applicable tolerance for the applied load for all other devices.~~
(Amended 1989 and 2005)

The SMA agreed with the proposed tolerances and recommended that the remaining proposed subparagraphs be added to NCWM Publication 14 through the Weighing Sector. The SMA agreed that Publication 14 requirements should be traceable to NIST Handbook 44; however, there is no need to add additional text to Handbook 44 to provide traceability. The SMA agreed that its alternate proposal provides the necessary traceability.

The SMA believes this is a harmonization issue. The SMA supports harmonization of U.S. and international requirements, but is concerned about the potential for unnecessarily increasing evaluation costs. However, the SMA does support this effort toward harmonization provided NTEP waives the resulting additional evaluation of existing devices.

The Committee noted that the proposed tolerances are absent from Handbook 44 and that tolerances usually appear in Handbook 44 rather than Publication 14. One added benefit to adopting the proposed creep test tolerances is that it harmonizes U.S. and international requirements. The Committee agreed with SMA's recommendation that time dependence test be performed as a type evaluation test and modified the proposal accordingly. Class I scales were intentionally omitted from the proposal because of the device's sensitivity to even minimal changes in environmental factors. The Committee supports the NTEP policy that existing devices will not be required to be reevaluated since most devices are expected to already comply with the proposal. To clarify all terminology in the proposed requirements that is not already defined in Handbook 44, the Committee made editorial changes to several terms; added two new definitions (D_{\max} and E_{\max}); amended the term "non-automatic weighing system" to read "non-automatic weighing instrument;" and included a reference to Section 2.20.

During the 2005 NCWM Annual Meeting, the Committee heard that there are jurisdictions that wish to continue to cite paragraph T.N.4.5. when a field inspection reveals an abnormal performance in a device's indications. In some cases, those devices are out of compliance with General Code paragraph G-UR.4.2. Abnormal Performance. The Committee acknowledged there may be other instances where it is appropriate to perform a time dependence test in the field under controlled conditions, based on a specific Scales Code requirement. Consequently, the Committee agreed to move forward with the entire proposal with modifications only to paragraph T.N.4.5. in the proposal to include provisions for conducting a time dependence test in the field when there are constant test conditions. The Committee notes that it may be necessary to exercise the load-receiving element prior to performing the time dependence test.





320-9 I List of International Symbols Noted as Acceptable










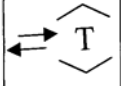












Source: Southern Weights and Measures Association (SWMA)

Recommendation: Add a new Appendix E as follows:

Appendix E

List of Acceptable Abbreviations/Symbols

Device Application	Term	Acceptable	Not Acceptable
The following symbols are intended for operator controls, indications, and features. When they are also intended for the customer (including customer-operated devices) they cannot be used without additional descriptions, directions, or marks displayed or marked on the device.			
	<u>zero key or center of zero indicator</u>		<u>"z" alone is not acceptable unless term is defined on device</u>
	<u>Off (Power)</u>		
	<u>On (Power)</u>		
	<u>On/Off (Power)</u>		

Device Application	Term	Acceptable	Not Acceptable
The following symbols are intended for operator controls, indications, and features. When they are also intended for the customer (including customer-operated devices) they cannot be used without additional descriptions, directions, or marks displayed or marked on the device.			
<u>Operational Controls, Indications, Features:</u>	<u>Print</u>		
	<u>Weighing</u>		
<u>Operational Controls, Indications, Features:</u>	<u>Scale n (n = 1, 2, ...)</u>		
	<u>Range n (n = 1, 2, ...)</u>		
	<u>High resolution</u>		
	<u>enter key</u>		
	<u>tare enter key</u>		
	<u>tare clear key</u>		
	<u>tare enter/tare clear</u>		
	<u>verify tare</u>		
	<u>Not for direct sales to the public</u>		
	<u>Combined zero/tare – See S.2.1.6. for additional information</u>		
	<u>Taring</u>		
	<u>Mass/Weight</u>		
	<u>Money</u>		
	<u>Price Per weight unit</u>		
	<u>Piece count</u>		
	<u>Counter</u>		
	<u>Read Counter</u>		
	<u>Print certificate</u>		
	<u>Information</u>		

Discussion: The proposed list of symbols introduces officials to a set of international symbols for use in marking operator controls, indications, and device features. Recognition and use of these symbols is consistent with efforts to harmonize U.S. and international device requirements.

Currently, the list of symbols is part of NCWM Publication 14 “Technical Policy, Checklists, and Test Procedures” for Weighing Devices. NTEP uses international symbols whenever possible. Style differences such as variations in the shape of arrows are acceptable.

The Southern Weights and Measures Association (SWMA) heard several concerns about the initial use of international symbols. Most weights and measures officials do not have access to Publication 14 or other international documents. Consequently, it was suggested that NCWM and NIST Weights and Measures Division post the list on their websites and incorporate the symbols into bulletins, examination procedure outlines, and inspector training modules. The increased number of customer-operated devices would require additional markings or descriptions to describe the less familiar symbols. This is especially true for symbols that represent “Not for Direct Sales,” “Total Money,” and “Price per Unit Weight,” which are not in widespread use in the United States. Once customers become familiar with the symbols, descriptions would no longer be necessary and the list of symbols would not be necessary in Handbook 44 or other documents.

The SWMA agreed that the proposed list of symbols would best serve field officials if placed in NIST Handbook 44 as an appendix.

The Committee agreed with SWMA on the need to familiarize officials with international symbols and recommended the proposed list of acceptable new symbols become a new Appendix E in Handbook 44. The Committee made several editorial changes to the table and agreed the proposal should be a voting item at the 2005 NCWM Annual Meeting.

During the 2005 NCWM Annual Meeting, the Committee agreed that unless the table references a specific code, then the table applies to all types of devices. The Committee believes that if the table is to be used as an enforcement tool, then only symbols in the proposed list would be considered acceptable. The Committee preferred an all-inclusive list of acceptable symbols over a WMD alternate proposal to develop a list of acceptable symbols that includes a statement indicating other symbols may be used without prior approval. SMA suggested an alternate proposal to designate the table as a list of commonly used international symbols. However, the Committee believes the intended scope of the list is much broader. If the table is intended to be all-inclusive, the other acceptable symbols currently in use for all device types, such as the dollar sign (\$) on retail motor-fuel dispensers and taximeters must be added to the list. The Committee considered SMA’s suggestion to eliminate the list of not acceptable symbols and retitle the columns to clarify that the symbols represents terms as well as functions. The Committee changed the status of the item from voting to an information item, to allow time to develop language that will link the table to specific codes and to assess whether or not the table should be all-inclusive.

321 BELT-CONVEYOR SCALE SYSTEMS

321-1 VC UR.3.4. Diversion or Loss of Measured Product (This item was adopted.)

Source: Western Weights and Measures Association (WWMA)

Recommendation: Add new paragraph UR.3.4. as follows:

UR.3.4. Diversion or Loss of Measured Product. - There shall be no operation(s) or condition(s) of use that result in loss or diversion that adversely affects the quantity of measured product.
(Added 2005)

Discussion: This proposal is intended to ensure that all product measured on the scale is delivered to the customer. There are several circumstances where the final amount of a commodity weighed on the system’s scale can be affected by operator practices. For instance, taking commodity samples or movement of commodities on belt

conveyors over long distances where product slippage from the belt can result in product loss before the customer has custody of the commodity. Without records, any major spillage results in an inaccurate payment for delivered product. The chain of custody of weighed material between the scale and the end point of a conveyor system should be maintained at all times. The diversion of a measured commodity by as much as 0.1 % becomes significant over a period of time and can affect royalty payments and taxes and can even have an environmental impact for some commodities.

Originally, the Western Weights and Measures Association (WWMA) and Central Weights and Measures Association (CWMA) considered an industry proposal to amend existing paragraphs UR.3.2. Maintenance and UR.3.3. Retention of Maintenance, Test, and Analog or Digital Recorder Information to address diversion of commodities by requiring this material be measured and recorded.

The WWMA heard comments from a manufacturer that supported the concept, but found the “measurable diversion of weighed material” somewhat ambiguous. The WWMA believed the intent of the proposal could be better stated and simplified. Consequently, the WWMA developed an alternate proposal similar in wording to the recommendation above adding a new paragraph UR.3.4. titled Diversion of Measured Product rather than suggest changes to existing paragraphs UR.3.2. and UR.3.3.

The CWMA withdrew the issue from its agenda because no data was provided to demonstrate there is an issue with diverted product.

At the 2005 NCWM Interim Meeting, the Committee further modified the language proposed by WWMA to clarify the requirement was intended to apply under conditions where weighed product is “loss” because it slips off the belt or is sampled and not returned to the end customer. The Committee agreed to present the item for a vote at the 2005 NCWM Annual Meeting.

322 AUTOMATIC BULK WEIGHING SYSTEMS

322-1 W Tolerances

(This item was withdrawn.)

Source: Carryover Item 322-1. (This item originated from the Northeastern Weights and Measures Association (NEWMA) and first appeared on the Committee’s 2002 agenda.)

Recommendation: Delete paragraphs T.1.4., T.2., T.2.1, T.3.2. and T.3.3.:

~~**T.1.4. To Tests Involving Digital Indications or Representations.—To the tolerances that would otherwise be applied, there shall be added an amount equal to one half the value of the scale division. This does not apply to digital indications or recorded representations that have been corrected for rounding using error weights.**~~

~~**T.2. Minimum Tolerance Values.—The minimum tolerance value shall not be less than half the value of the scale division.**~~

~~**T.2.1. For Systems used to Weigh Construction Materials.—The minimum maintenance and acceptance tolerance shall be 0.1 % of the weighing capacity of the system, or the value of the scale division, whichever is less.**~~

~~**T.3.2. For Systems used to Weigh Grain.—The basic maintenance tolerance shall be 0.1 % of test load.**~~

~~**T.3.3. For all Other Systems.—The basic maintenance tolerance shall be 0.2 % of test load.**~~

Renumber paragraph T.3. and renumber and modify T.3.1. as follows:

T.3.2. Basic Tolerance Values.

T.3.2.1. Acceptance Tolerance. -The basic acceptance tolerance shall be one-half the basic maintenance tolerance, **but never less than 1 division.**
(Amended 200X)

Add new paragraphs T.2.2., T.2.3., and T.2.3.1. and Table 1. and Table 2. as follows:

T.2.2. General. - **The tolerance applicable to devices not marked with an accuracy class shall have the tolerances applied as specified in Table 1. below.**

<u>Table 1. Tolerance for Unmarked Scales</u>			
<u>Type of Device</u>	<u>Tolerance</u>	<u>Decreasing Load Multiplier</u>	<u>Other applicable Requirements</u>
<u>Grain Hoppers</u>	<u>Class III, T.2.3 (table 2)</u>	<u>1.0</u>	<u>T.2.1., T.2.3.1</u>
<u>Other Systems</u>	<u>Class III L, T.2.3 (table 2)</u>	<u>1.0</u>	<u>T.2.1., T.2.3.1</u>

(Added 200X)

T.2.3. Tolerances Applicable to Devices Marked III or III L.

T.2.3.1. Maintenance Tolerance Values - **The maintenance tolerance values are specified in Table 2 below.**

<u>Table 2. Maintenance Tolerance for Marked Scales</u> <u>(All values in this table are in scale divisions)</u> <u>Tolerance in scale divisions</u>				
<u>Class</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>5</u>
	<u>Test Load</u>			
<u>III</u>	<u>0 – 500</u>	<u>501 - 2000</u>	<u>2001 – 4000</u>	<u>4001 +</u>
<u>III L</u>	<u>0 – 500</u>	<u>501 - 1000</u>	<u>(Add 1d for each additional 500 d or fraction thereof)</u>	

(Added 200X)

Add a new footnote to Section 2.20 Scales Code Table 1.1.1. Tolerances for Unmarked Scales as follows:

^xAutomatic bulk weighing systems see Section 2.22 for specifications and tolerances.
(Added 200X)

Discussion: Since 2002, the Committee has considered a proposal to change the automatic bulk weighing systems tolerances from a percentage basis to division values, which are based on the device's accuracy class. The proposal was intended to align tolerances in the Automatic Bulk Weighing Systems (ABWS) Code and the Scales Code.

The Committee has kept the proposal as an information item to allow interested parties sufficient time to work through issues surrounding the permissible system errors and other concerns. The U.S. Grain Inspection, Packers and Stockyard Administration (GIPSA) opposed the proposed tolerances because of concerns about the allowable cumulative error in a system's performance. GIPSA also cited its 17-year history of successful implementation of current ABWS code requirements.

The Western Weights and Measures Association heard no comments on the proposal, but remains concerned about the potential cumulative effect of allowable errors that are the result of the proposed step tolerances.

The Northeastern Weights and Measures Association (NEWMA) continues to welcome the opportunity for more discussion with the S&T Committee and GIPSA. NEWMA believes the minor differences in tolerance applications

on a few borderline cases do not justify having a unique code for a device that is identical in design and performance to devices evaluated under the Scales Code. NEWMA provided two contacts if anyone wanted to discuss the proposal; Bill Wilson (Clinton County, New York) at 518-565-4681, by fax at 518-565-4694, or at wilsonperu@aol.com or contact Ross Andersen (New York) at 518-457-3146, by fax at 518-457-5693, or at ross.andersen@agmkt.state.ny.us.

The Central Weights and Measures Association (CWMA) expressed concern that the proposal might not have technical merit and was developed as the result of each regulatory agency's preference for a particular code format. The CWMA was also concerned that adopting the proposal would effect step tolerances to the point that older devices with an n_{\max} greater than 4000 would not comply.

During the 2005 NCWM Interim Meeting, the Committee heard that NEWMA was continuing work on a survey to determine how officials apply the ABWS Code tolerances. The Committee decided at that time to keep the proposal an information item to allow GIPSA, NEWMA, the grain industry, and all other parties affected by the proposed changes to the ABWS tolerances additional time to compare data and agree on an appropriate set of tolerances for systems that fall under the ABWS Code. GIPSA did not comment at the meeting but it had reiterated its earlier opposition to the proposal to WMD in advance of the meeting. In anticipation that NEWMA would have the results of its survey at the July 2005 NCWM Annual Meeting the Committee kept this issue an information item, but planned to move the proposal to a developing item if no survey data was available in July 2005.

At the July 2005 NCWM Annual Meeting, there were no new developments and NEWMA and GIPSA, still held differing positions on the proposal. The results from the survey distributed by NEWMA in July 2005 were not available. The Committee decided to withdraw this item because, after 3 years of deliberations, no consensus could be reached by the parties affected by the proposal.

For more background information, refer to the 2002, 2003, and 2004 S&T Final Reports.

330 LIQUID-MEASURING DEVICES

330-1 V S.1.6.1. Indication of Delivery; Electronic Devices

(This item was adopted.)

Source: National Type Evaluation Technical Committee (NTETC) Measuring Sector

Recommendation: Modify Section 3.30. paragraph S.1.6.1. Indication of Delivery as follows:

S.1.6.1. Indication of Delivery. – The device shall automatically show on its face the initial zero condition and the quantity delivered (up to the nominal capacity).

(a) ~~However, For electronic devices manufactured prior to January 1, 2006,~~ the first 0.03 L (or 0.009 gal) of a delivery and its associated total sales price need not be indicated.

(b) For electronic devices manufactured on or after January 1, 2006, the measurement, indication of delivered quantity, and the indication of total sales price shall be inhibited until the fueling position reaches conditions necessary to ensure that the delivery starts at zero.

[Nonretroactive as of January 1, 2006]

(Added 2005)

(Amended 1982 and 2005)

Discussion/Background: At the 2004 NTETC Measuring Sector meeting, Maryland Weights and Measures stated that as the price for motor fuel nears or exceeds \$2 per gallon, the number of complaints it receives regarding computer jump has increased. NIST Weights and Measures Division (WMD) has received numerous calls from jurisdictions related to this problem. It appears that the actual amount of jump or meter creep occurring because of internal pressure changes related to changes in temperature has not increased. However, at the higher unit prices this relatively small meter creep results in an indication of several cents. Concern was expressed that there was no

guidance in Handbook 44 regarding criteria or tolerances for “computer jump.” Prior to 1987 Handbook 44 had a test note (paragraph N.4.3.) and tolerance (paragraph T.2.4.) in the Liquid-Measuring Devices Code for conducting an elapsed time test. At the 1986 NCWM Annual Meeting the NCWM voted to delete those paragraphs. The discussion of that item indicates that a suggestion was received that all references to an elapsed time test should be removed because: (1) none are being conducted, and (2) the conditions that caused their inclusion in Handbook 44 have for the most part been eliminated. In 1986, if a consumer experienced a computer jump that resulted in an indication of money value prior to opening the nozzle, the consumer normally could return the dispenser to the off position and start the delivery from “zero.” Currently, if a customer is making a fuel purchase using a credit or debit card at the pump, any indication of delivery is automatically charged to the customer’s account; therefore, returning the dispenser to the “off” position and re-starting the delivery from “zero” does not resolve the problem and the consumer is charged for undelivered product. Maryland and WMD provided a proposal to eliminate the indication of computer jump for the Sector to consider. The Sector agreed with the proposal in principle, but recommended some changes to the language (including the use of the term “fueling position”) as indicated in the recommendation and agreed to forward it to the NCWM and the Southern Weights and Measures Association (SWMA) S&T Committees for consideration. A manufacturer of retail motor-fuel dispensers stated that “fueling position” is a recognized industry term that is preferable in this case to the term “dispenser.” Dispensers typically have hoses on two sides. The term “fueling position” is applicable to only one side at a time.

At its October 2004 meeting, the SWMA heard no opposition to the Measuring Sector proposal. The SWMA agreed to forward the proposal to the Committee with the recommendation that it be a voting item on the 2005 NCWM S&T Agenda. The SWMA also recommended that the Committee consider adding similar requirements to Handbook 44 Section 3.32. as appropriate.

At the 2005 Interim Meeting, several dispenser manufacturers expressed concern with the use of the term “normal delivery pressure,” in the original proposal, since the pressure within a system can vary during normal use. The Committee met with three dispenser manufacturers to develop new nonretroactive language in which the word “pressure” is changed to “condition” as indicated in the Recommendation. The new requirement does not allow the measurement of product until the fueling position reaches normal delivery condition (packed hose) up to the nozzle. If the system meets the new requirement, the dispenser will indicate zero until the nozzle is opened and product begins to flow. The Committee agreed that making the requirement nonretroactive was appropriate to provide manufacturers time to develop a mechanism for eliminating computer jump on new devices. For devices already in the field, officials can use paragraph UR.3.1. Return of Indicating and Recording Elements to Zero and General Code paragraph G-S.2. Facilitation of Fraud to require that the primary indicating element be returned to zero prior to the start of each delivery. The Committee agreed this item should be presented for a vote at the 2005 NCWM Annual Meeting.

At the 2005 NCWM Annual Meeting, the Committee agreed that paragraph S.1.6.1. should be modified as shown in the recommendation above to clarify when the suppression (masking) of indications is permitted and when the inhibition (prevention) of measurement and indication is required. The Committee further amended the proposal to clarify what is meant by “normal delivery conditions.” The Committee believes the proposal would eliminate “computer jump” on new devices installed in the field and over time will eliminate the problem on most retail motor fuel dispensers, similar to the near elimination of scales being found “off zero” after the automatic zero-setting mechanism requirement was added to the Scales Code. During the voting session, an official requested that additional language be added to the discussion to clarify how a dispenser would operate if this item were adopted. The Committee agreed to add the following language to the discussion: “To comply with the new requirement, a dispenser shall operate as follows. Begin with the valve in the nozzle “closed” and activate the dispenser. After initialization (i.e., first indication of zero) of the dispenser is complete, the display of volume and total price shall indicate “zero” and shall increment only in coincidence with product flow after the valve in the nozzle is opened.”

330-2 VC N.4.2.2. Retail Motor-Fuel Devices

(This item was adopted.)

Source: National Type Evaluation Technical Committee (NTETC) Measuring Sector

Recommendation: Modify Section 3.30, paragraph N.4.2.2. Retail Motor-Fuel Devices as follows:

N.4.2.2. Retail Motor-Fuel Devices.

- (a) Devices ~~without~~ a marked minimum flow-rate ~~capacity less than 100 L (25 gal) per minute~~ shall have a "special" test performed at the slower of the following rates:
- (1) 19 L (5 gal) per minute, or
 - (2) ~~the minimum discharge rate marked on the device, or~~
 - ~~(3) the minimum discharge rate at which the device will deliver when equipped with an automatic discharge nozzle set at its slowest setting.~~
- (b) Devices ~~marked~~ with a marked minimum flow-rate ~~capacity 100 L (25 gal) or more per minute~~ shall have a "special" test performed at or near the marked minimum flow rate, ~~slowest of the following rates:~~
- ~~(1) the minimum discharge rate marked on the device, or~~
 - ~~(2) the minimum discharge rate at which the device will deliver when equipped with an automatic discharge nozzle set at its slowest setting.~~
- (Added 1984) (Amended 2005)

Discussion/Background: At its October 2004 meeting, the NTETC Measuring Sector discussed a test scenario in which a retail motor-fuel device (RMFD) was marked with flow rates of 60 gpm maximum and 12 gpm minimum, where the actual flow rate on the lowest setting of the automatic nozzle was 6 gpm. The laboratory posed the following questions regarding this situation:

Paragraph S.4.4.1. Discharge Rates, requires that RMFDs with a designed maximum flow rate of 30 gpm or greater be marked with a minimum and maximum flow rate. RMFDs with a designed maximum flow rate of less than 30 gpm are not required to have a maximum and minimum flow rate marking, but such a marking is not prohibited. Paragraph N.4.2.2. (b) in the LMD Code states that "Devices marked with a flow-rate capacity of 100 L (25 gal) or more per minute shall have a "special" test performed at the slowest of the following rates: (1) the minimum discharge rate marked on the device, or (2) the minimum discharge rate at which the device will deliver when equipped with an automatic discharge nozzle set at its slowest setting." The question is if a RMFD is marked with a minimum flow rate, is it appropriate to operate the device below the marked minimum flow rate?

There appears to be a conflict between the test notes and the user requirements for RFMDs that are marked with a maximum and minimum flow rate. General Code paragraph G-UR.3.1. Method of Operation states that a device is to be used in the manner that is indicated by instructions on the equipment. Paragraphs N.4.2.2. (a) and (b) both contain testing procedures that instruct a weights and measures official to conduct a test of a dispenser at a flow rate that is less than the minimum flow rate that may be marked on the device. The manufacturers of RMFDs present at the 2004 Measuring Sector meeting stated that it is not appropriate to require accuracy for a device when it is operated below the marked minimum flow rate.

The Sector agreed that officials should not test below the minimum flow rate marked on the device because the device is not designed to operate accurately at lesser flow rates. The Sector also agreed to propose changing the flow rate of 25 gpm in paragraph N.4.2.2. to 30 gpm to agree with the marking requirements in paragraph S.4.4.1. The Sector agreed to forward a proposal that both issues to the NCWM and Southern Weights and Measures Association (SWMA) for consideration.

At its October 2004 meeting, the SWMA heard concerns with the proposed changes to paragraph N.4.2.2. Retail Motor-Fuel Devices. The SWMA recommended that officials not test at a flow rate less than the minimum flow rate marked on a device. However, the Sector's proposal as worded creates conflicts with other requirements in paragraph N.4.2.2. Consequently, the SWMA agreed that the proposal should not be forwarded to the Committee.

Following the SWMA meeting, NIST Weights and Measures Division (WMD) developed the alternative shown above to address the concerns of the SWMA with the original Measuring Sector proposal.

When first adopted, paragraph N.4.2.2. contained only two test criteria which stipulated that the slow flow test be made at the slower of 19 L (5 gal) per minute or the minimum flow rate marked on the device. In 1971, the Committee received several communications that RMFDs equipped with an automatic nozzle were often operated at a discharge rate established by the automatic nozzle when set at its slowest setting. Paragraph N.4.2.2. was modified to include the provision for testing with an automatic nozzle set on the lowest notch, if the flow rate at that setting was less than 19 L (5 gal) per minute, or the minimum flow rate marked on the device. In 1971 few, if any, RMFDs were marked with a minimum flow rate and the information provided by the manufacturer (and sometimes marked on the device) typically stated that the device was accurate at any flow rate.

In 1984, when “high gallonage” dispensers gained popularity in the marketplace, paragraph S.4.4. Marking Requirements/For Retail Devices Only, (now paragraph S.4.4.1. Discharge Rates), was added to require dispensers with a maximum flow rate of 25 gpm or greater to be marked with maximum and minimum flow rates. At that time paragraph N.4.2.3., which later became the present paragraph N.4.2.2. (b), was added to the Handbook. It was the view of the Committee that the minimum flow rate for these dispensers would be greater than 5 gallons per minute so that specific flow rate was not included in the test criteria of new paragraph N.4.2.2.

General Code paragraph G-UR.2.3. Installation, states “that equipment shall be operated only in the manner that is indicated by instructions on the equipment (minimum flow rate).” Some dispensers are equipped with a latch on the nozzle lever which, when set at its lowest setting, may cause the dispenser to operate below the marked minimum flow rate. WMD noted that the Committee may want to consider a user requirement in the LMD Code that does not allow a latch on the nozzle to create this situation since such a component would facilitate inappropriate and inaccurate use of the device.

At the 2005 Interim and Annual Meeting, the Committee received no comments on this item. The Committee agreed that the alternate proposal prepared by WMD resolved the issue of what flow rates are appropriate when conducting a field examination of a RMFD and agreed to present the item for a vote.

331 VEHICLE-TANK METERS

331-1 I Temperature Compensation

Source: Carryover Item 331-1 (This item originated from the Western Weights and Measures Association (WWMA) and first appeared on the Committee’s 2000 agenda.)

Recommendation: Modify Section 3.31. Vehicle-Tank Meters (VTM) Code by adding the following new paragraphs to recognize temperature compensation as follows:

S.2.4. Automatic Temperature Compensation for Refined Petroleum Products.

S.2.4.1. Automatic Temperature Compensation for Refined Petroleum Products. - A device may be equipped with an automatic means for adjusting the indication and registration of the measured volume of product to the volume at 15 °C (60 °F), where not prohibited by State Law.

S.2.4.2. Provision for Deactivating. - On a device equipped with an automatic temperature-compensating mechanism that will indicate or record only in terms of liters (gallons) compensated to 15 °C (60 °F), provision shall be made for deactivating the automatic temperature-compensating mechanism so that the meter can indicate and record, if it is equipped to record, in terms of the uncompensated volume.

S.2.4.3. Gross and Net Indications - A device equipped with automatic temperature compensation shall indicate and record, if equipped to record, both the gross (uncompensated) and net (compensated) volume for testing purposes. If both values cannot be displayed or recorded for the same test draft, means shall be provided to select either the gross or net indication for each test draft.

S.2.4.4. Provision for Sealing Automatic Temperature-Compensating Systems. - Adequate provision shall be made for an approved means of security (e.g., data change audit trail) or physically applying security seals in such a manner that an automatic temperature-compensating system cannot be disconnected and that no adjustment may be made to the system.

S.2.4.5. Temperature Determination with Automatic Temperature Compensation. - For test purposes, means shall be provided (e.g., thermometer well) to determine the temperature of the liquid either:

(a) In the liquid chamber of the meter, or

(b) Immediately adjacent to the meter in the meter inlet or discharge line.

(Added 200X)

S.5.6. Temperature Compensation for Refined Petroleum Products. - If a device is equipped with an automatic temperature compensator, the primary indicating elements, recording elements, and recording representation shall be clearly and conspicuously marked to show that the volume delivered has been adjusted to the volume at 15 °C (60 °F).

(Added 200X)

N.4.1.3. Automatic Temperature-Compensating Systems for Refined Petroleum Products. - On devices equipped with automatic temperature-compensating systems, normal tests shall be conducted:

(a) by comparing the compensated volume indicated or recorded to the actual delivered volume corrected to 15 °C (60 °F); and

(b) with the temperature-compensating system deactivated, comparing the uncompensated volume indicated or recorded to the actual delivered volume.

The first test shall be performed with the automatic temperature-compensating system operating in the "as found" condition. On devices that indicate or record both the compensated and uncompensated volume for each delivery, the tests in (a) and (b) may be performed as a single test.

(Added 200X)

N.5. Temperature Correction for Refined Petroleum Products. - Corrections shall be made for any changes in volume resulting from the differences in liquid temperatures between the time of passage through the meter and time of volumetric determination in the prover. When adjustments are necessary, appropriate petroleum measurement tables should be used.

(Added 200X)

T.2.1. Automatic Temperature-Compensating Systems. - The difference between the meter error (expressed as a percentage) for results determined with and without the automatic temperature-compensating system activated shall not exceed:

(a) 0.4 % for mechanical automatic temperature-compensating systems; and

(b) 0.2 % for electronic automatic temperature-compensating systems.

The delivered quantities for each test shall be approximately the same size. The results of each test shall be within the applicable acceptance or maintenance tolerance.

(Added 200X)

UR.2.5. Temperature Compensation for Refined Petroleum Products.

UR.2.5.1. Automatic.

UR.2.5.1.1. When to be Used. - In a State that does not prohibit, by law or regulation, the sale of temperature-compensated product a device equipped with an operable automatic temperature compensator shall be connected, operable, and in use at all times. An electronic or mechanical automatic temperature-compensating system may not be removed, nor may a compensated device be replaced with an uncompensated device, without the written approval of the responsible weights and measures jurisdiction.

[Note: This requirement does not specify the method of sale for product measured through a meter.]

UR.2.5.1.2. Invoices. - An invoice based on a reading of a device that is equipped with an automatic temperature compensator shall show that the volume delivered has been adjusted to the volume at 15 °C (60 °F).

(Added 200X)

Discussion/Background: When this item was originally submitted, several officials reportedly were confused about the specific meter applications covered by an NTEP Certificate of Conformance for a meter that included the temperature-compensation feature. The Western Weights and Measures Association (WWMA) acknowledged some jurisdictions permit temperature-compensated deliveries in applications that are not addressed by NIST Handbook 44. Some states do not allow the use of automatic temperature compensation for the delivery of products using a VTM.

At the 2002 and 2003 NCWM Annual Meetings, this item did not achieve a majority vote to pass or fail and was, therefore, returned to the Committee for further consideration.

At the 2004 NCWM Annual Meeting, the Committee stated its position on Item 331-1 as follows:

The Committee believed that the Specifications, Test Notes, Tolerances, and User Requirements contained in the proposal are technically correct and provide both weights and measures officials and the NTEP laboratories with the proper criteria to use when evaluating a vehicle-tank meter (VTM) with temperature-compensation capability. The addition of this language to the VTM Code does not require, approve, nor solicit any jurisdiction to either prohibit or accept the use of temperature compensation in that jurisdiction. The Committee further stated that the adoption of a nationally accepted method of sale for temperature compensation by all jurisdictions will not be obtainable in the foreseeable future and encouraged each jurisdiction to adopt by either statute, rule, or regulation requirements that prohibit, permit, or require temperature compensation in their jurisdiction.

The Committee agreed there were a sufficient number of states that needed the new requirements as an inspection tool to warrant adding the proposal to NIST Handbook 44 at that time without waiting for method of sale requirements to be added to NIST Handbook 130.

At the 2004 NCWM Annual Meeting, this item did not achieve a majority vote to pass or fail and was, therefore, returned to the Committee for further consideration.

At its September 2004 Interim Meeting, the Central Weights and Measures Association (CWMA) agreed with the Committee that nothing in this proposal requires a jurisdiction to permit or prohibit the sale of petroleum products that have been temperature compensated. The CWMA recognized the technical merit of the proposal and felt that requirements are needed in Handbook 44; however, the CWMA further agreed that this is also a “method of sale” issue and that the proposal should be retained as an information item until an accompanying method of sale requirement is added to Handbook 130.

At its September 2004 meeting, the WWMA agreed with the Committee that nothing in this proposal requires a jurisdiction to permit or prohibit the sale of petroleum products that have been temperature compensated. The

WWMA continues its strong support of this proposal and recommends that this item go forward for adoption by the NCWM.

At its October 2004 meeting, the Northeastern Weights and Measures Association (NEWMA) members were informed that the L&R Committee requested that the Board of Directors fund a work group to determine if requirements for temperature compensation should be added to Handbook 130 and, if so, what wholesale and retail areas should be covered. Several participants believed a work group was unnecessary and that work groups should not be created just because a subject is controversial. These members felt there were other items where work groups could be better used. NEWMA also suggested removing the words “recognition of” from the title of Item 331-1.

At the 2005 NCWM Interim Meeting, the Committee participated in a combined open hearing with the L&R Committee for discussion of this item and L&R Item 232-1 Temperature Compensation for Petroleum Products. A special forum was also held on the first day of the Interim Meeting to discuss temperature compensation issues. At both the forum and open hearing, the Committee received little or no new information on this item and considered withdrawing it from its agenda. However, the Committee was informed that the L&R Committee kept its Item 232-1 as a developing issue. The L&R Committee considered modifying Item 232-1 to become two separate Items: 232-1A and 232-1B; Item 232-1A would address VTMs and Item 232-1B would address other meter types. However, the L&R Committee decided not to split the item. Instead, the L&R Committee modified Item 232-1 to allow temperature compensation for the sale of petroleum products other than LPG and products sold through retail motor-fuel devices and changed the status of the item to a “Developing” issue.

During the 2005 NCWM Annual Meeting S&T Committee’s open hearing, a manufacturer stated that the number of requests from retailers for retail motor-fuel dispensers with temperature-compensation capability is increasing. The Committee agreed to keep the item on the agenda until the L&R Item 232-1 was further developed. (See L&R Item 232-1.)

For additional background on this item, see the NCWM 2000 through 2004 S&T Final Reports.

331-2 VC S.1.4.1. Display of Unit Price

(This item was adopted.)

Source: National Type Evaluation Technical Committee (NTETC) Measuring Sector

Recommendation: Modify Section 3.31. paragraph S.1.4.1. Display of Unit Price as follows:

S.1.4.1. Display of Unit Price. - In a device of the computing type, means shall be provided for displaying ~~on the outside of the device~~, in a manner clear to the operator and an observer, the unit price at which the device is set to compute. **The unit price is not required to be displayed continuously.**
(Amended 1983 **and 2005**)

Discussion/Background: At the 2004 Measuring Sector meeting, a manufacturer of vehicle-tank meters (VTM) asked the Sector to provide input on the intent of Handbook 44 Section 3.31. paragraph S.1.4.1. Display of Unit Price. The Sector was asked to determine whether or not the unit price must be displayed continuously. The manufacturer referred to the final report of the 1983 NCWM S&T Committee. In that report under S&T Item 304-2 the Committee stated its view that it is appropriate for a digital electronic indicating element associated with a VTM to utilize a shared display; that is, the same display area can be used to indicate the volume delivered, the unit price, and the total price. However, the information is not required to be displayed simultaneously. The Sector agreed the intent of the S&T Committee was clear and it decided to forward to the NCWM and the Southern Weights and Measures Association (SWMA) for consideration a recommendation to add text to clarify S.1.4.1.

At its October 2004 meeting, the SWMA agreed with the Measuring Sector’s interpretation of the intent of S.1.4.1. and agreed to forward the recommendation shown above to the Committee as a voting item.

At the 2005 NCWM Interim and Annual Meetings, the Committee heard no opposition to this item and agreed to present it for a vote.

331-3 VC S.2.4. Zero Set-Back Interlock, Vehicle-Tank Meters, Electronic
(This item was adopted.)

Source: Carryover Item 331-3. (This item originated from the Southern Weights and Measures Association (SWMA) and first appeared on the Committee's 2004 agenda.)

Recommendation: Add a new paragraph S.2.4. to Section 3.31. Vehicle-Tank Meters (VTM) as follows:

S.2.4. Zero-Set-Back Interlock, Vehicle-Tank Meters, Electronic. – Except for vehicle-mounted metering systems used solely for the delivery of aviation fuel, a device shall be so constructed that after an individual or multiple deliveries at one location have been completed, an automatic interlock system shall engage to prevent a subsequent delivery until the indicating and, if equipped, recording elements have been returned to their zero position. For individual deliveries, if there is no product flow for 3 minutes the transaction must be completed before additional product flow is allowed. The 3-minute timeout shall be a sealable feature on an indicator.

[Nonretroactive as of January 1, 2006]

(Added 2005)

Background/Discussion: The original SWMA proposal applied to both mechanical and electronic registers in VTM applications. The manufacturers of VTM registers agreed that it is not economically practical to modify existing mechanical registers to include a zero set-back interlock or to add that feature to new production of mechanical registers. At the October 2004 meeting of the Measuring Sector, the members developed an alternate recommendation to add a new paragraph S.2.4. to Handbook 44, Section 3.31. Vehicle-Tank Meters that applies only to electronic registers. The Sector agreed to forward the proposal to the NCWM S&T and the SWMA Committees for consideration.

At its October 2004 meeting, the SWMA reviewed the Measuring Sector's recommendation. The SWMA agreed with the proposal provided, that the 3-minute time-out feature be sealable and agreed that the word "may" be changed to "shall" in the last sentence. The SWMA agreed to forward its modified proposal to the S&T Committee with the recommendation that it be a voting item on the Committee's 2005 Agenda.

At the 2005 NCWM Interim Meeting, one official stated that mechanical registers should be included in the requirement for a zero-set-back interlock. The Committee believes it is not practical to modify the mechanical registers currently in use in vehicle-tank meter applications and that attempting to include them in this requirement would significantly delay adoption of any requirement for a zero-set-back interlock. The Committee also believes the number of new mechanical registers being installed is declining and will continue to do so. The Committee recognizes that, while it is more difficult to detect and take enforcement action, paragraph UR.2.3. Ticket in Printing Device, provides a mechanism for stopping the "riding of tickets" between deliveries. The Committee agreed with the SWMA recommendation to modify the Measuring Sector's proposal and to present the modified proposal in the recommendation above for a vote at the 2005 NCWM Annual Meeting.

For additional background on this item, see the NCWM 2004 S&T Final Report.

At the 2005 NCWM Annual Meeting, the Committee heard no opposition to this item.

331-4 VC N.4.2. Special Tests (Except Milk-Measuring Systems), N.4.5. Product Depletion Test, T.4. Product Depletion Test, and Table T.4. tolerances for Vehicle-Tank Meters on Product Depletion Tests, Except Milk Meters
(This item was adopted.)

Source: Carryover Item 331-2. (This item originated from the Northeastern Weights and Measures Association (NEWMA) and first appeared on the Committee's 2003 agenda.)

Recommendation: Amend paragraph N.4.2. Special Tests (Except Milk-Measuring Systems) as follows:

N.4.2. Special Tests (Except Milk-Measuring Systems). - “Special” tests shall be made to develop the operating characteristics of a measuring system and any special elements and accessories attached to or associated with the device. Any test except as set forth in N.4.1. and N.4.5. shall be considered a special test. Special tests of a measuring system shall be made ~~as follows:~~

~~(a)~~ at a minimum discharge rate of 20 % of the marked maximum discharge rate or at the minimum discharge rate marked on the device whichever is less;-
(Amended 2005)

~~(b) to develop operating characteristics of the measuring system during a split compartment delivery.~~

Add new paragraphs N.4.5. Product Depletion Test and T.4. Product Depletion Test and Table T.4. Tolerances as follows:

N.4.5. Product Depletion Test. - Except for vehicle-mounted metering systems used solely for the delivery of aviation fuel, the effectiveness of the vapor eliminator or vapor elimination means shall be tested by dispensing product at the normal flow rate until the product supply is depleted and continuing until the lack of fluid causes the meter indication to stop completely for at least 10 seconds. If the meter indication fails to stop completely for at least 10 seconds, continue to operate the system for 3 minutes. Finish the test by switching to another compartment with sufficient product to complete the test on a multi-compartment vehicle or by adding sufficient product to complete the test to a single compartment vehicle. When adding product to a single compartment vehicle, allow appropriate time for any entrapped vapor to disperse before continuing the test. Test drafts shall be of the same size and run at approximately the same flow rate.
(Added 2005)

T.4. Product Depletion Test. - The range of the test results for the normal test and the product depletion test shall not exceed the tolerance shown in Table T.4. Test drafts shall be of the same size and run at approximately the same flow rate.

[Note: The result of the product depletion test may fall outside of the applicable test tolerance as specified in Table T.2.]
(Added 2005)

<u>Table T.4. Tolerances for Vehicle-Tank Meters on Product Depletion Tests, Except Milk Meters</u>	
<u>Meter Size</u>	<u>Maintenance and Acceptance Tolerances</u>
<u>Up to but not including 50 mm (2 in)</u>	<u>1.70 L (104 in³)¹</u>
<u>From 50 mm (2 in) up to but not including 75 mm (3 in)</u>	<u>2.25 L (137 in³)¹</u>
<u>75 mm (3 in) or larger</u>	<u>3.75 L (229 in³)¹</u>
¹ <u>Based on a test volume of at least 1 minute flow in accordance with N.3.</u>	

(Table Added 2005)

Discussion: The measurement of vapor when product is depleted during the vehicle-tank meter (VTM) “split compartment” test (product depletion test) is a system problem and the amount of vapor measured is not related to the size of the test draft. The proposal requires a product depletion test for single compartment vehicles to verify the performance of the air elimination mechanism. Currently paragraph N.4.2.(b) refers only to a “split-compartment” delivery, implying that the test should only be conducted on multi-compartment vehicles. The proposal

recommends modifying the tolerances so that the applicable tolerance is based on the meter's flow rate and remains constant regardless of the size of the test draft and modifies the language to clarify that the product depletion test is to be conducted on both single- and multi-compartment vehicles.

At its October 2004 meeting, the NTETC Measuring Sector reviewed an alternate proposal for a new Table T.4. developed by Maryland Weights and Measures and NIST WMD based on the Measurement Canada tolerance structure that categorizes meters by size (pipe diameter) for product depletion tests. The VTM manufacturers present at the meeting verified that there is a definite correlation between the meter size and the achievable maximum flow rate. The Sector agreed with the alternate proposal and provided an example of how the product depletion test would be applied and a note stating that the results of the product depletion test could fall outside of the applicable tolerance if the meter being tested were included in Table T.4. as shown in the recommendation above. The Sector agreed to forward the alternate proposal to the Southern Weights and Measures Association (SWMA) and the Committee for consideration.

At the October 2004 NEWMA meeting, New York proposed that an NCWM work group be formed to research this item and supplied a discussion paper in support of the proposal. NEWMA agreed to forward its recommendation for a work group and the paper to the Committee for consideration.

At its October 2004 Meeting, the SWMA heard no opposition to the Measuring Sector's proposal. One official asked if a similar requirement should be added to the Section 3.30. Liquid-Measuring Devices for wholesale meters and to Section 3.32. LPG and Anhydrous Ammonia Liquid-Measuring Devices. The SWMA agreed to forward the proposal to the NCWM S&T Committee with the recommendation that it be a voting item on the Committee's 2005 Agenda. The SWMA also recommended that the Committee consider adding similar appropriate requirements to Sections 3.30. and 3.32. for testing the effectiveness of vapor elimination means.

Following the 2004 fall meetings of NEWMA, SWMA, and the NTETC Measuring Sector, New York Weights and Measures worked with WMD to add another category of meter sizes to the proposed Table T.4. from the NTETC Measuring Sector as shown in the recommendation above. This change was based on New York's concern that a large number of vehicle-tank meters less than 2.0 inches are still in use in that state. The tolerance for meters smaller than 2.0 inches was developed based on the current tolerance for a draft of at least 1 minute's flow for a typical meter of that size. However, the tolerance is not directly related to draft size and remains unchanged even if the draft size is increased.

At the 2005 NCWM Interim Meeting, the Committee heard support for the proposal with the changes recommended by New York and WMD and agreed to present the modified proposal for a vote at the 2005 Annual Meeting.

During the open hearing at the 2005 NCWM Annual Meeting, a manufacturer of vehicle-tank meters informed the Committee of safety concerns with conducting a product depletion test on an aircraft refueling system. The creation of vapor within the system during the conduct of a product depletion test can cause an explosion hazard. The technical advisor to the Committee from Measurement Canada concurred with this comment and advised that Measurement Canada no longer conducts such tests on meters used for aircraft refueling. The Committee agreed that, because there is a safety concern and that many aircraft refueling systems use effective means other than a "vapor eliminator" to prevent the passage of vapor or air through the meter, aircraft refueling systems should be exempt from the product depletion tests and proposed modifying paragraph N.4.5. Product Depletion Test, as shown in the recommendation above.

For additional background on this item, see the NCWM 2003 and 2004 S&T Committee Final Reports.

336 WATER METERS

336-1 I Table N.4.2. Flow Rate and Draft Size for Water Meters Special Tests

Source: Northeastern Weights and Measures Association (NEWMA)

Recommendation: Amend Table N.4.2. as follows:

Table N.4.2. Flow Rate and Draft Size for Water Meters Special Tests						
Meter size (inches)	Intermediate Rate			Minimum Rate		
	Rate of flow (gal/min)	Meter indication/Test Draft		Rate of flow (gal/min)	Meter indication/Test Draft	
		gal	ft³		gal	ft³
Less than or equal to 5/8	2	10	1	1/4	5 <u>10</u>	1
3/4	3	10	1	1/2	5 <u>10</u>	1
1	4	10	1	3/4	5 <u>10</u>	1
1 1/2	8	50	5	1 1/2	10	1
2	15	50	5	2	10	1
3	20	50	5	4	10	1
4	40	100	10	7	50 <u>100</u>	5
6	60	100	10	12	50 <u>100</u>	5

(Table Added 2003) (**Amended 200X**)

Discussion/Background: At the fall 2004 NEWMA meeting, a manufacturer submitted the proposal revisions to Table N.4.2. shown above. The manufacturer explained that a test draft of 5 gallons is not large enough to provide repeatability for dial indicating water meters sized 1 inch and smaller. The dial indicator for these devices has 100 graduations of 1/10 gallon, which means one complete revolution equals 10 gallons. The effect of parallax on the reading and gear backlash both contribute to the lack of repeatability of indications when using a 5-gallon test draft. The manufacturer recommended that any test of the device include, at a minimum, at least one complete revolution of the dial indicator. None of the jurisdictions represented at the NEWMA meeting routinely test water meters; therefore, they could not provide any input on the technical merits of the proposal. However, NEWMA agreed to forward the proposal to the Committee for consideration.

At the 2005 NCWM Interim Meeting, the only concern the Committee heard was that the time required for some tests would increase significantly. The submitter of the proposal did not attend the Interim Meeting. The Committee agreed to make the proposal an information item to provide an opportunity for review and comment from the regional associations, especially jurisdictions routinely conducting water meter tests. If additional support and comments are not received by the 2006 NCWM Interim Meeting, the Committee may withdraw this item.

At the 2005 NCWM Annual Meeting, there was no discussion on this item.

360 OTHER ITEMS

360-1 V Proposed Section 5.59. Electronic Livestock, Meat, and Poultry Evaluation Systems and/or Devices -Tentative Code

(This item was adopted.)

Source: Southern Weights and Measures Association (SWMA)

Recommendation: Add a Tentative Code Section 5.59. Livestock, Meat, and Poultry Evaluation Systems and/or Devices as follows:

Sec. 5.59. Electronic Livestock, Meat, and Poultry Evaluation Systems and/or Devices - Tentative Code. - This tentative code has only a trial or experimental status and is not intended to be enforced. The requirements are designed for study prior to the development and adoption of a final Code for Livestock, Meat, and Poultry Evaluation Systems and/or Devices. Officials wanting to conduct an official

examination of a device or system are advised to see paragraph G-A.3. Special and Unclassified Equipment.
(Tentative Code Added 2005)

A. Application

A.1. - This code applies to electronic devices or systems for measuring the composition or quality constituents of live animals, livestock and poultry carcasses, and individual cuts of meat or a combination thereof for the purpose of determining value.

A.2. - See also Sec. 1.10; General Code requirements.

A.3. - This code does not apply to scales used to weigh live animals, livestock and poultry carcasses, and individual cuts of meat unless the scales are part of an integrated system designed to measure composition or quality constituents. Scales used in integrated systems must also meet NIST Handbook 44 Section 2.20. requirements.

S. Specifications

S.1. Design and Manufacture - All design and manufacturing specifications shall comply with ASTM Standard F 2342 Standard Specification for Design and Construction of Composition or Quality Constituent Measuring Devices or Systems.

N. Notes

N.1. Method of Test. - Performance tests shall be conducted in accordance with ASTM Standard F 2343 Test Method for Livestock, Meat, and Poultry Evaluation Devices.

N.2. Testing Standards. - ASTM Standard F 2343 requires device or system users to maintain accurate reference standards that meet the tolerance expressed in NIST Handbook 44 Fundamental Considerations, paragraph 3.2. (i.e., one third of the smallest tolerance applied.)

N.3. Verification. - Device or system users are required to verify and document the accuracy of a device or system on each production day as specified by ASTM Standard F 2341 Standard Practice of User Requirements for Livestock, Meat, and Poultry Evaluation Devices or Systems.

N.3.1. Official Tests. - Officials are encouraged to periodically witness the required “in house” verification of accuracy. Officials may also conduct official tests using the on-site testing standards or other appropriate standards belonging to the jurisdiction with statutory authority over the device or system.

T. Tolerances

T.1. Tolerances on Individual Measurements. - Maintenance and acceptance tolerances on an individual measurement shall be as shown in Table T.1.

<u>Table T.1. Tolerances</u>	
<u>Individual linear measurement of a single constituent</u>	<u>√ 1 mm (0.039 in)</u>
<u>Measurement of area</u>	<u>√ 1.6 cm² (0.25 in²)</u>
<u>For measurements of other constituents</u>	<u>As specified in ASTM Standard F 2343</u>

UR. User Requirements

UR.1. Installation Requirements.

UR.1.1. Installation. - All devices and systems shall be installed in accordance with manufacturer's instructions.

UR.2. Maintenance of Equipment.

UR.2.1. Maintenance. - All devices and systems shall be continually maintained in an accurate condition and in accordance with the manufacturer's instructions and ASTM Standard F 2341.

UR.3. Use requirements.

UR.3.1. Limitation of Use. - All devices and systems shall be used to make measurements in a manner specified by the manufacturer.

UR.4. Testing Standards. - The user of a commercial device shall make available to the official with statutory authority over the device testing standards that meet the tolerance expressed in Fundamental Considerations, paragraph 3.2. (i.e., one third of the smallest tolerance applied). The accuracy of the testing standards shall be verified annually or on a frequency as required by the official with statutory authority and shall be traceable to a national standard.

Discussion: In 2000 the Grain Inspection, Packers, and Stockyards Administration (GIPSA) branch of the United States Department of Agriculture (USDA) approached NIST Weights and Measures Division (WMD) and the NCWM to discuss the development of standards for devices used to measure fat content in animal carcasses. Because neither the NCWM nor NIST had the resources needed to develop such a standard, the American Society for Testing and Materials (ASTM) was asked to facilitate development of a standard. The ASTM agreed to develop standards, (now known as ASTM Standard F10) for Livestock, Meat, and Poultry Evaluation Systems for the measurement of fat and other quality constituents in animal carcasses. Some of these devices or systems will measure only a single constituent, which will be used to determine the value of the carcasses or primal cuts. Other systems may integrate the measurement of several constituents such as fat, lean, marbling, pH, and color, to determine carcass value.

The NCWM agreed that if USDA was able to develop standards for these devices outside of the NCWM, the NCWM would consider adopting these standards as a tentative code in NIST Handbook 44. The code in Handbook 44 is needed to provide an enforcement tool for USDA and other jurisdictions wanting to have a mechanism for conducting inspections of these devices and approving or rejecting them according to the results of the inspection. The ASTM Standards are voluntary standards that only have the effect of law when they are adopted into regulation by a jurisdiction with statutory authority over these devices. Including or referencing such standards in Handbook 44 provides a method for that adoption.

At its October 2004 meeting, the SWMA reviewed a draft tentative code for livestock, meat, and poultry evaluation systems and devices prepared by WMD. The SWMA agreed to forward the proposal to the Committee for addition to Handbook 44 as a tentative code with the recommendation that it be a voting item on the 2005 NCWM S&T Agenda.

At the 2005 NCWM Interim Meeting, the Committee heard no opposition to this proposal and agreed to present it for a vote at the 2005 NCWM Annual Meeting.

At the 2005 NCWM Annual Meeting, one official stated that the proposal was not ready for adoption and would not be used by weights and measures officials. Another official stated that Handbook 44 should not apply to devices used for grading purposes. Several individuals stated that the purpose of a tentative code is to provide a trial period and to facilitate necessary changes prior to making a code "permanent." Attendees at the 2005 NCWM Annual Meeting and at the Spring 2005 Central and Northeastern Weights and Measures Associations Annual Meetings were provided with a list of "frequently asked questions and answers" relating to Electronic Livestock, Meat, and

Poultry Evaluation Systems and/or Devices; these FAQs are included in Appendix B. The FAQs were also posted on the Weights and Measures Directors' list server in June 2005. After consideration of the comments it received the Committee decided to recommend the item for adoption by the NCWM.

360-2 V Appendix A Fundamental Considerations 3. Testing Apparatus; 3.1 Adequacy, 3.2 Tolerances for Standards and Footnote 2, and 3.3 Accuracy of Standards
(This item was adopted.)

Source: Western Weights and Measures Association (WWMA)

Recommendation: Amend Appendix A Fundamental Considerations 3. Testing Apparatus as follows:

Add amended Footnote 2 to paragraph 3.1 Adequacy as follows:

3. Testing Apparatus

3.1. Adequacy.² - Tests can be made properly only if, among other things, adequate testing apparatus is available. Testing apparatus may be considered adequate only when it is properly designed for its intended use, when it is so constructed that it will retain its characteristics for a reasonable period under conditions of normal use, when it is available in denominations appropriate for a proper determination of the value or performance of the commercial equipment under test, and when it is accurately calibrated.

²Recommendations regarding the specifications and tolerances for suitable field standards may be obtained from the Weights and Measures Division of the National Institute of Standards and Technology; for the standards will meet the specifications of length, mass, and capacity used by weights and measures officials, may be obtained upon request from the Weights and Measures Division of the National Institute of Standards and Technology Handbook 105-Series standards (or other suitable and designated standards). This section shall not preclude the use of additional field standards and/or equipment, as approved by the Director, for uniform evaluation of device performance.

Amend paragraphs 3.2 Tolerances for Standards and 3.3 Accuracy of Standards as follows:

3.2. Tolerances for Standards.² - ~~The error in a standard used by a weights and measures official should be known and corrected for when the standard is used; or if the standard is to be used without correction, its error should be not greater than one-third of the smallest tolerance to be applied when the standard is used. The reason for this is to keep at a minimum the proportion of the tolerance on the item tested that will be used up by the error of the standard. Expressed differently, Except for work of relatively high precision, it is recommended that the accuracy of standards used in testing commercial weighing and measuring equipment be established and maintained so that the use of corrections is not necessary. When the standard is used without correction, its combined error and uncertainty must be less than one-third of the applicable device tolerance.~~

Device testing is complicated to some degree when corrections to standards are applied. When using the correction of the standard, the uncertainty associated with the corrected value must be less than one-third of the applicable device tolerance. ¶The reason for this requirement is to give the item device being tested as nearly as practicable the full benefit of its own tolerance.

Field testing operations are complicated to some degree when corrections to standards are applied. Except for work of relatively high precision, it is recommended that the accuracy of standards used in testing commercial weighing and measuring equipment be so established and maintained that the use of corrections is not necessary. Also, whenever it can readily be done, it will be desirable to reduce the error on a standard below the one-third point previously mentioned.

3.3. Accuracy of Standards. - Prior to the official use of testing apparatus, its accuracy should invariably be verified. Field Sstandards should be ~~re-verified~~ calibrated as often as circumstances require. By their nature,

metal volumetric **field** standards are more susceptible to damage in handling than are standards of some other types. A **field** standard should be ~~re~~-calibrated whenever damage is known or suspected to have occurred or significant repairs have been made. In addition, **field** standards, particularly volumetric standards, should be ~~re~~-calibrated with sufficient frequency to affirm their continued accuracy, so that the official may always be in an unassailable position with respect to the accuracy of his testing apparatus. Secondary **field** standards, such as special fabric testing tapes, should be verified much more frequently than such basic standards as steel tapes or volumetric provers to demonstrate their constancy of value or performance.

Accurate and dependable results cannot be obtained with faulty or inadequate **field** standards. If either the service person or official is poorly equipped, their results cannot be expected to check consistently. Disagreements can be avoided and the servicing of commercial equipment can be expedited and improved if service persons and officials give equal attention to the adequacy and maintenance of their testing apparatus.

Discussion: In July 2000, the Metrology Subcommittee began formal discussions on inconsistencies in laboratory calibration practices for ensuring the traceability of field standards. A NIST work group further developed the Subcommittee's recommendations into proposals to modify NIST Handbook 44 as shown in the recommendation above. It also submitted proposals for changes to the requirements in NIST Handbook 130 "Uniform Laws and Regulations" to include guidelines for suitable reference standards, test procedures, and practices for determining whether or not to allow the use of field standards as test apparatus.

Both Handbooks required updating for consistency and to recognize current accepted accreditation and recognition practices for field standards, where applicable. The Handbooks should be modified to align international and national metrological terminology and to adequately define and clarify terms already in use that relate to field standard verification such as: accreditation, calibration, recognition, standards (field, primary, reference, secondary, and working), traceability, uncertainty, and verification. The proposal added the term "field" to distinguish the type of physical standard in use for testing of devices. The proposal also specifies the appropriate documentary standards and specifies that the field standard's combined error and uncertainty must be less than one-third of the applicable device tolerance.

The Subcommittee recommended corresponding modifications to Handbook 130 (see L&R Agenda Item 221-1 and Item 234-1). Metrological terminology would be updated and, where permitted, calibration interval adjustments based on statistical data would be allowed to improve the accuracy of field standards in use and provide more cost-effective use of resources. The Subcommittee further recommended that Handbook 130 reference the entire NIST Handbook 105 Series as well as other suitable designated standards. To expedite matters and recognize the latest technology, proposed amendments would permit "Placed in Service Reports" for registered service agencies to be forwarded electronically to the State Director rather than mailed. Finally, to ensure measurements are allowable, organizations issuing calibration reports must be recognized by NIST or approved by an accreditation body.

The WWMA recommended the proposal as a voting item.

The Central Weights and Measures Association (CWMA) believes that device tolerances already allow for uncertainties, which field officials find difficult to determine. The CWMA also believes that use of the term "calibrated" changes the intent of paragraph 3.3. Consequently, the CWMA withdrew the proposal from its Interim Agenda.

The Northeastern Weights and Measures Association recommended the proposal become a developing item, but did not provide a rationale for taking that position.

During the 2005 NCWM Interim Meeting, the Committee met jointly with the L&R Committee to discuss and to take testimony on this proposal. The Committee heard only a request that the terms "initial verification" and "subsequent verification" be identified in the corresponding L&R proposal. Both Committees agreed that the proposal will eliminate inconsistencies and provide for recognition of current metrological practices. Consequently, the Committee agreed that the issues should move forward for a vote in July 2005. Modifications were planned for L&R Item 221-1 to include adding new definitions of "initial verification" and "subsequent verification" since both terms are referenced in the proposed guidelines for examination and calibration or certification of standards and testing equipment.

A list of frequently asked questions (FAQs) was distributed at the July 2005 NCWM Annual Meeting and distributed on the Weights and Measures Directors list server in June 2005 to provide additional background information on the changes proposed to NIST Handbooks 130 and 44; these FAQs are included in Appendix C. One point not specified in the FAQs or proposal is the expanded uncertainty to an approximate 95 % confidence level. The three interrelated items passed with several modifications to L&R items that addressed the definitions of primary and secondary standards and the examination and certification of test standards. For more details on this item, see the 2005 L&R Final Report.

360-3 I International Organization of Legal Metrology (OIML) Report

Many issues before the OIML, the Asian-Pacific Legal Metrology Forum (APLMF), and other international groups are within the purview of the S&T Committee. Additional information on OIML activities is available in Appendix A of the 2005 Board of Directors Final Report and on the OIML website at <http://www.oiml.org>. NIST Weights and Measures Division (WMD) provided updates on OIML activities during the open hearing session on Monday, July 18, 2005. For more information on specific OIML device activities contact the WMD staff listed in the table below:

NIST Weights and Measures Division Contact List				
Staff	Telephone	Email	Device Type	Postal Mail or Fax
Steven Cook (LMD)	301-975-4003	steven.cook@nist.gov	Automatic Weighing Systems Weighing Devices	NIST WMD 100 Bureau Dr MS 2600 Gaithersburg, MD 20899-2600 Fax: 301-926-0647
Richard Harshman (LMD)	301-975-8107	richard.harshman@nist.gov	R134 “Weighing Road Vehicles In-Motion” R60 “Load Cells”	
Diane Lee McGowan (LMD)	301-975-4405	diane.lee@nist.gov	R51 Grain Moisture Meters Near Infrared Grain Analyzers	
Ralph Richter (ILM)	301-975-4025	ralph.richter@nist.gov	R117 “Measuring Systems for Liquids Other Than Water” R105 “Direct Mass Flow Measuring Systems for Quantities of Liquids” and Gas Meters	
Wayne Stiefel (ILM)	301-975-4011	s.stiefel@nist.gov	Measuring Devices	
Dr. Ambler Thompson (ILM)	301-975-2333	ambler@nist.gov	Electronic Measuring Devices	
Juana Williams (LMD)	301-975-3989	juana.williams@nist.gov	R21 Taximeters	
LMD - Legal Metrology Devices Group ILM - International Legal Metrology Group				

360-4 I Add International Terms that are Synonymous to NIST Handbook 44 Terms in Appendix D; Definitions

Source: Carryover Item 360-4. (This item originated from the Northeastern Weights and Measures Association (NEWMA) and first appeared on the Committee's 2002 agenda.)

Discussion: Many Handbook 44 and OIML technical concepts and procedures are in harmony, yet there are significant differences in the terminology used. The harmonization of language is not necessary to harmonize requirements, provided a state of equivalence exists; however, improvements should be promoted where the language is confusing or has the potential for misinterpretation. Currently, the U.S. National Work Group (USNWG) on R76 "Non-automatic Weighing Instruments" is working on a proposal to amend NIST Handbook 44 Appendix D, Definitions to include international terminology that is synonymous with Handbook 44 definitions. This item is intended to familiarize the public and private sectors with the proposed approach to modify Appendix D. The USNWG will identify Handbook 44 terms or definitions that are equivalent to international vocabulary by placing the corresponding OIML term in parentheses adjacent to the Handbook term.

The development of this proposal will also clarify terminology for international participants in the proposed Mutual Acceptance Arrangement (MAA) (see the 2005 Board of Directors Final Report, Appendix A for more information), where it is imperative that all parties are aware of and understand each other's requirements. Similar terms can have a different meaning in Handbook 44 than they do in R76. Handbook 44 is also inconsistent in the use of many terms such as "division," "increment," and "interval." One additional goal is to eliminate any confusion about other frequently used terms such as "device," "element," "mechanism," "scale," "weigher," and "balance."

NEWMA supports this item and views it as a first step toward familiarizing officials and other users of the Handbook with new terminology and believes that future efforts should include work to place terms in Handbook 44 with the goal of having one mutually acceptable set of terminology.

At its 2004 meeting, the Western Weights and Measures Association requested that the USNWG continue to develop the terms and asked that the proposal remain an information item.

The Central Weights and Measures Association (CWMA) believes international terms serve no purpose for the field official. The CWMA believes this is an issue for NCWM Publication 14, "NTEP Technical Policy, Checklists, and Test Procedures;" therefore, the proposal should be withdrawn from the S&T Agenda.

The Scale Manufacturers Association supports the efforts of the USNWG and looks forward to reviewing the final proposal as an information item.

The Committee concurred with NEWMA's assessment that the proposal is a necessary step for harmonizing U.S. and international terminology and later standards. The Committee heard support from industry for the proposal. Industry requested an opportunity to review the final product. The Committee decided to keep this proposal as an information item on its agenda to update the weights and measures community on this important work in the harmonization of standards and to allow the work group sufficient time to complete its comparison of Handbook 44 General Code and Scales Code terms with equivalent international terminology.

360-5 D Developing Issues

The NCWM established a mechanism to disseminate information about emerging issues that have merit and are of national interest. Developing issues have either not received sufficient review by parties affected by the proposal or may be insufficiently developed to warrant action by the Committee. These issues are currently under review by at least one regional association or technical committee. The developing issues are listed in Appendix A according to the specific NIST Handbook 44 Code Section under which they fall.

The S&T Committee encourages interested parties to examine the proposals included in Appendix A and send their comments to the contact listed in each item. The Committee also asks that the regional weights and measures associations and National Type Evaluation Technical Committee Sectors continue their work to fully develop each proposal. Should an association or Sector decide to discontinue work on a developmental item, the Committee asks that it be notified.

Jack Kane, Montana, Chairman
Clark Cooney, Oregon
Carol P. Fulmer, South Carolina
Todd R. Lucas, Ohio
Michael J. Sikula, New York

Ted Kingsbury, Canada, Technical Advisor
Richard Suiter, NIST, Technical Advisor
Juana Williams, NIST, Technical Advisor

Committee on Specifications and Tolerances

Appendix A

Item 360-1: Proposed Section 5.59. Electronic Livestock, Meat, and Poultry Evaluation Systems and/or Devices -Tentative Code

Electronic Meat Evaluation Systems Frequently Asked Questions	
1. Why did ASTM develop these standards?	In 2000, U.S. Department of Agriculture Grain Inspection and Packers and Stockyard Administration (GIPSA) approached NIST & NCWM to request the development of a standard for carcass evaluation devices. When it was determined that neither the NCWM nor NIST had the resources needed to develop such a standard, ASTM was asked to guide the task. After an initial meeting with representatives from GIPSA, NCWM, and NIST, ASTM agreed to form the Committee F10 to develop standards for devices and systems for the measurement of fat and other quality constituents in Livestock, Meat, and Poultry.
2. What standards did ASTM develop?	The ASTM Committee F10 developed four separate standards to address design, use, testing, and predictive accuracy for these devices and systems. They are designated as: F2340 – 04 “Standard Specification for Developing and Validating Prediction Equation(s) or Model(s) Used in Connection with Livestock, Meat, and Poultry Evaluation Devices(s) or System(s) to Determine Value” F2341 – 03 “Standard Practice for User Requirements for Livestock, Meat, and Poultry Evaluation Devices or Systems” F2342 – 03 “Design and Construction of Composition or Quality Constituent Measuring Devices or Systems” F 2343 – 04 “Standard Test Method for Livestock, Meat, and Poultry Evaluation Devices”
3. What does the term “Predictive Accuracy” mean?	The original title for the draft standard developed by ASTM Subcommittee F10 – 40 was “Predictive Accuracy.” The title of the final document F2340 – 04 was changed to “Standard Specification for Developing and Validating Prediction Equation(s) or Model(s).” The new title better describes statistical procedures and the scientific approach that system/device manufacturers must follow to establish equations, algorithms, etc., that predict fat content for an entire carcass. Manufacturers may use sampling methods, limited measurements, and formula similar to those used to determine quality constituents such as moisture, starch, or oil content, in grain.
4. Were all interested parties involved in the standards development process?	The F10 Committee and Subcommittees included representatives from device manufacturers, meat packers, livestock producer associations, GIPSA, USDA Agriculture Marketing Service (AMS), NIST, NCWM, and University Meat Science Programs.
5. Do the ASTM standards follow the same format as NIST Handbook 44?	Three of the Standards are each similar in format to the Specifications (F2342 – 03), Test Notes and Tolerances (F 2343 – 04), and User Requirements (F2341 – 03), sections of a Handbook 44 code. The Standard for Prediction of Value (F 2340 - 04) is not; however, this is not a weights and measures issue.
6. Why should a tentative code for these devices be added to Handbook 44?	The devices and systems covered by these standards are commercial devices that have impacted over 80 % of the sale and harvesting of over 100 million hogs and over 35 million cattle with a value of billions of dollars (the latest estimate [2005] is \$38.8 billion). ASTM standards are voluntary standards and are only “legal requirements” when they are cited in a law or regulation. Having a code in Handbook 44 will provide States who wish to include these devices in their registration and inspection programs with the legal authority to do so through the adoption of Handbook 44.

7. Will W&M jurisdictions have to purchase the ASTM standards?	States may want to have one reference set of some or all four of the standards in their main office. W&M Regional training funds left over at the end of the year could also be used to purchase copies of the standards. The cost is currently \$28 each.
8. Why shouldn't the NCWM/NIST just develop a new code for Handbook 44?	Resources are still not available to conduct what would now be a duplication of effort.
9. What is "in it" for weights and measures?	Similar to regulation of other commercial devices, programs will be able to verify the accuracy of the devices and systems that measure the constituents used to determine the value of livestock, meat, and poultry being produced and sold within their jurisdiction.
10. Won't weights and measures officials require training to be able to test these devices? Who will provide the necessary training?	Yes – GIPSA and NIST plan to discuss the development of a training program for these devices. The scope of the training will be developed in these discussions.
11. What types of certified standards are necessary to verify device accuracy?	The manufacturers of various devices can supply calibration standards with the devices at time of installation. The users of the devices are required to have the standards verified annually, to an appropriate tolerance (#1/3 of device tolerance), at an appropriate laboratory.
12. What additional equipment must be purchased in order to test these devices?	The users of the devices are required to have appropriate <u>certified</u> standards on site for testing the devices. Weights and measures jurisdictions may want to, but will not be forced to, have their own standards in order to conduct inspections
13. If devices use different technologies to make similar measurements will the end result be the same?	The standards were written to be applicable regardless of the type of measurement technology utilized. If two different technologies are used to make the same type of measurement (either within the same facility or at two different facilities) and the same formula is used to determine value, the end result should be the same.
14. Why doesn't USDA GIPSA just test these devices themselves?	Similar to livestock scales and in-motion monorail scales GIPSA will have requirements for accuracy verification of these devices. GIPSA will test these devices during investigations; however, GIPSA does not have the manpower to handle the routine inspections.
15. Why isn't there a standard formula for calculating the price adjustments made based on measurements from these devices?	At present, different packing companies have different criteria for what they consider to be their preferred characteristics for the animals they purchase. In the future competition <u>may</u> drive "standard formula" to be adopted across the industry.
16. If the formula can vary from packer to packer what is the value of testing the measurement devices?	Equity in the transactions begins with, and can only be assured with, accurate devices. From that point, the livestock producer can determine which packing company provides the best pricing structure for the particular characteristics of the animals he or she offers for sale.
17. Will the USDA GIPSA require these devices to be tested?	Yes, GIPSA is drafting regulations similar to those that require livestock scales and monorail scales to be tested for accuracy on a regular basis. These regulations will reference NIST Handbook 44 requirements.

Appendix B

Item 360-2: Appendix A Fundamental Considerations

3. Testing Apparatus; 3.1 Adequacy, 3.2 Tolerances for Standards and Footnote 2, and 3.3 Accuracy of Standards

Frequently Asked Questions (FAQs)

Proposed NIST Handbook (HB) 44 Changes for Test Standards

A work group was formed to review and modify the original proposed technical updates to NIST Handbooks 130 and 44. This group carefully reviewed each change, modified wording to assure clarity and brevity, and evaluated the effect of each change on individual weights and measures programs. Changes are proposed for NIST Handbook 130 “Uniform Laws and Regulations” Weights and Measures Law and Voluntary Registration Regulation, and NIST Handbook 44 “Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices, Appendix A Fundamental Considerations.

What are the key points of the changes?

Specifically, one change would update terminology in both handbooks. Updates were planned for terms such as “primary” and “secondary” standard to reflect the international usage of each term. Additional terms and their definitions would be added, such as “reference standard,” “field standard,” “traceability,” and “uncertainty.” Terms would be added only if they are used elsewhere in the document.

Some of the proposed changes would allow State directors more discretion when evaluating calibration intervals, referencing documentary standards, and accepting calibration reports. Handbook 130 currently states that field standards must be calibrated annually. The proposed language would allow adjustment of field standard calibration intervals based on historical calibration data. Intervals could be increased for standards such as stainless steel weights or decreased for standards such as weight carts or cast iron weights. State directors would also be able to reference documentary standards other than in NIST documents when defining specifications for field standards. Currently, there are some standards used in the field with no corresponding NIST document defining their specifications. Allowing American Society for Testing and Materials (ASTM), International Organization of Legal Metrology (OIML) or other documentary standards to be referenced would fill this void. Finally, State directors would be able to accept calibration reports from both State laboratories and accredited industry laboratories recognized by NIST Weights and Measures Division (WMD). Some states are already accepting accredited calibrations from private industry. The new language would provide guidance for making the decision about which labs are acceptable and what additional information is necessary before accepting their calibration reports.

Another change clarifies the uncertainty to tolerance ratios required when selecting field standards. The tolerance ratio is currently described as a “3 to 1” ratio, with no additional explanation. The new language clearly defines what this means and will help State directors and weights and measures officials select appropriate equipment when conducting field tests.

Why are these changes being proposed?

Changes are being proposed to these sections of Handbook 130 and Handbook 44 for several reasons. First, there is a need to update terminology in both handbooks in order to conform to international definitions. Second, many states have changed calibration intervals on field standards. Allowing for adjustment of calibration intervals based on statistical data is in alignment with reality, and is sound rationale for varying from annual intervals. Third, expanding acceptable references to a generic list of documentary standards allows jurisdictions to adopt industry or international standards, in addition to the standards developed by NIST. Fourth, allowing states to determine which calibration reports are acceptable for calibration of field equipment gives more options to each jurisdiction. It is especially important to understand that the concept of traceability is evaluated by formal accreditation and recognition methods. Self-declaration and the use of NIST test numbers are no longer considered acceptable indications of traceability. Finally, the tolerance ratios described in Handbook 130 need additional explanation and clarification.

What does this mean to our State program?

These proposed changes would have a relatively small effect on state and local weights and measures programs. There is no mandate for a jurisdiction to change the way it currently operates; however, the changes would allow local control and flexibility with respect to field standards and their calibration intervals. Additionally, the new language documents what is already being done in practice in many states. It promotes international uniformity and would allow the use of industry and international documentary standards in addition to NIST Handbooks.

How do I set appropriate calibration intervals?

When setting initial calibration intervals, it is recommended that a jurisdiction set a base interval of one year. For additional information on setting initial intervals for a variety of field standards, see the list of recommendations at the end of this document. In order to adjust or change a calibration interval, it is necessary to have sufficient historical calibration data, which includes “as-found” measurement data. In addition to data, it is also necessary to have a statistically valid approach for modifying the intervals. The laboratory metrologist should be familiar with adjusting calibration intervals for laboratory standards, and may be a useful resource for both providing data and statistical analysis. For more information on statistical approaches to changing calibration intervals, consult National Conference of Standards Laboratories International (NCSLI) RP #1 on Setting and Adjusting Calibration Intervals. It is important to remember that suitable care and handling is essential when using field standards. Jurisdictions may require verification and oversight of field standards even if not providing a full calibration.

Why should we allow adjustment of calibration intervals?

One of the reasons for allowing the adjustment of calibration intervals is to save money and time by having calibrations done at suitable frequencies rather than at arbitrary fixed intervals. It will also lead to improved accuracy, by ensuring that field standards are within tolerance during the entire calibration interval. The goal is to “calibrate the day before an item goes out of tolerance,” but the reality is simply cost-effective risk management. Accurate analysis of calibration intervals can provide evidence needed to defend the tolerance of field standards, but this requires calibration data, analysis, and accompanying documentation of the program.

How do I know which documentary standards to reference?

When referencing documentary standards, refer to the sample list provided with this document and consult your laboratory metrologist for input. For unique equipment, it may be necessary to consult the manufacturer. NIST, OIML, and ASTM provide many field standard specifications. Determine if suitable industry or international standards are available. If no documentary standard exists for a field standard, it may be necessary to write one. To do this, the specifications, tolerances, and requirements must be identified and documented. It may be useful to consult the manufacturer when writing the specifications. The State director must also assess uncertainties for the field standard and its measurement impact, and evaluate their laboratory’s ability to calibrate or obtain a calibration for the field standard.

What do we do with field standards that don’t meet the specifications? What about measurement areas where we don’t have documentary standards?

When a field standard does not meet specifications outlined in an accepted documentary standard, a State director must evaluate the impact of the deviation on the measurement results, as well as the functionality, efficiency, and safety of the device. State directors have local authority and flexibility to accept and designate field standards and to allow grandfathering and deviations from standard specifications. They may require unique calibration intervals for these field standards or they may reject and/or confiscate the standard based on evaluation results.

How do I know if a laboratory’s calibration reports are acceptable? How do we create the “accepted list?”

In order to determine which calibration reports are acceptable, several criteria must be evaluated. First, determine if the laboratory providing the calibration report is accredited by a National Cooperation for Laboratory Accreditation (NACLA) approved accreditation body or recognized by WMD as capable of providing traceable measurement results. If the lab passes this first step, evaluate the scope of accreditation or recognition and assess the laboratory’s

best measurement uncertainty to make sure that they can provide the services needed. Be sure that the calibration report provided contains values and associated uncertainties. State metrologists or technical experts at NIST may be able to assist in evaluating the acceptability of outside calibration reports.

Why do we need to have initial verification of field standards?

Even when a laboratory provides an accredited calibration report meeting the uncertainty to tolerance requirements specified, there is no guarantee that the field equipment meets specifications. It may be necessary for field standards to have an initial evaluation by a weights and measures jurisdiction before being put into service. It is the responsibility of a weights and measures agency to ensure that suitable field standards are used for official inspections. Accreditation is not conformity assessment and should not be used for that purpose. New field standards must be evaluated for compliance with specifications and for impact on measurement results.

How do we evaluate the uncertainties versus the tolerance requirements in the Fundamental Considerations? Where can I get more information?

In determining the suitability of a field standard, it is necessary to evaluate the uncertainty to tolerance ratio. In order to do this, both the uncertainty of the field standard and the tolerance of the device to be tested must be known. Additionally, it is important to know whether or not the field standard has been adjusted to its nominal value. If an adjustment has been made, a comparison between the uncertainty and tolerance is all that is necessary. Here, the uncertainty should be no more than one-third of the tolerance. The calibration report for the field standard should contain the uncertainty of the measurement. If the field standard has been left with an associated correction, the correction and the uncertainty must be combined before making the comparison with the tolerance. Both the correction and the uncertainty should be listed on the calibration report. When added together, their sum should be no more than one-third of the tolerance of the device under test. State metrologists should be able to provide additional information regarding evaluating uncertainties of field standards.

Sample list of documentary standards that can be used as specifications and tolerances for “field standards.”

Sample List of Documentary Standards and Calibration Intervals			
Standards	Device	Calibration Interval	Comments
HB 105-1, Cast iron	Class III, IIIL, IV scales	6 month to 1 year	
HB 105-1, Stainless steel	Class III, IIIL, IV scales	5 year	
OIML R111, Class F1 ASTM E 617-97, Class 2	Class II scales	1 year	
HB 105-2, glassware	Package testing	10 year	
HB 105-3, test measures (hand-held and 5 gal truck/trailer mounted)	Gas pumps	1 year	
HB 105-3, large provers	Meters	1 year	
HB 105-4, LPG provers	LPG meters	1 year	
HB 105-5, stopwatches	Taxi meters, timing devices, parking meters, Laundromats	1 year	
HB 105-6, thermometers ASTM E1	Temperature corrections, refrigeration specs, package checking	5 year	Inspection required annually
HB 105-7, small volume provers	Meters	6 months, extendable to 1 year	Need EPO for field testing.
API document in development	Master Meters for petroleum		

Sample List of Documentary Standards and Calibration Intervals			
Standards	Device	Calibration Interval	Comments
ASTM E 74, proving rings and load cells	Wheel load weighers, weight carts, large mass standards	Rings: 5 years Cells: 6 months if used for wheel load weighers; evaluate with use for substitution weighing	Depends on use.
HB 105-8, weight carts	Vehicle scales	6 months to 1 year; recalibration for any repair	Need EPO for field use.
ASTM E 100, hydrometers	Petroleum products; bulk oil meters	1 year	
Federal Specification GGG – standard; Length standards, tapes	Taxi meters, fabric, scale decks, firewood, lobster gauges	5 years; inspection before use	
Containers (HB 133)	Bulk mulch		
HB 44, Berry Baskets	Berry quantity		
API - American Petroleum Institute HB 105 Series - A series of NIST technical documents that include “Specifications and Tolerances for Reference Standards and Field Standard Weights and Measures” HB 133 - A NIST technical document that includes specifications and other requirements for “Checking the Net Contents of Packaged Goods”			

Appendix C

Item 360-5: Developing Issues

Part 1, Item 1 General Code: G-S.5.6.1. Recorded Representation of Metric Units on Equipment with Limited Character Sets

Source: Western Weights and Measures Association (WWMA)

Recommendation: Modify paragraph G-S.5.6.1. as follows:

G-S.5.6.1. ~~Recorded Representation of Metric Units on Equipment with Limited Character Sets~~ Acceptable Abbreviations for Recorded and Indicated Representation of Units on Equipment. - The appropriate defining symbols are shown in Table 1.

Add the following new abbreviations to Table 1 Representation of Units to the General Code:

<u>Name of Unit</u>	<u>Common Use Symbol</u>	<u>Representation</u>			<u>Name of Unit</u>	<u>Common Use Symbol</u>	<u>Representation</u>		
		<u>Form I</u> <u>(double case)</u>	<u>Form II</u> <u>(single lower case)</u>	<u>Form II</u> <u>(single case upper)</u>			<u>Form I</u> <u>(double case)</u>	<u>Form II</u> <u>(single lower case)</u>	<u>Form II</u> <u>(single case upper)</u>
<u>Inches</u>	<u>in</u>	<u>In</u>	<u>in</u>	<u>IN</u>	<u>deciliter</u>	<u>dL</u>	<u>dL</u>		
<u>Foot</u>	<u>ft</u>	<u>ft</u>	<u>ft</u>	<u>FT</u>	<u>Kiloliter</u>	<u>kL</u>	<u>kL</u>		
<u>Yard</u>	<u>yd</u>	<u>yd</u>	<u>yd</u>	<u>YD</u>	<u>cubic meter</u>	<u>M³</u>	<u>m³</u>	<u>m³</u>	<u>M³</u>
<u>milligram</u>	<u>mg</u>	<u>mg</u>	<u>mg</u>		<u>cubic inches</u>	<u>in³</u>	<u>in³</u>	<u>in³</u>	<u>IN³</u>
<u>megagram</u>	<u>Mg</u>	<u>Mg</u>			<u>cubic foot</u>	<u>ft³</u>	<u>ft³</u>	<u>ft³</u>	<u>FT³</u>
<u>Grain</u>	<u>gr</u>	<u>gr</u>	<u>gr</u>		<u>cubic yard</u>	<u>yd³</u>	<u>yd³</u>	<u>yd³</u>	<u>YD³</u>
<u>Dram</u>	<u>dr</u>	<u>dr</u>	<u>dr</u>		<u>Gills</u>	<u>gi</u>	<u>gi</u>	<u>Gi</u>	<u>GI</u>
<u>Ounce</u>	<u>oz</u>	<u>oz</u>	<u>oz</u>	<u>OZ</u>	<u>Pint</u>	<u>pt</u>	<u>pt</u>	<u>pt</u>	<u>PT</u>
<u>Pound</u>	<u>lb</u>	<u>lb</u>	<u>lb</u>	<u>LB</u>	<u>Quart</u>	<u>qt</u>	<u>qt</u>	<u>qt</u>	<u>QT</u>
<u>hundredweight</u>	<u>cwt</u>	<u>cwt</u>	<u>cwt</u>	<u>CWT</u>	<u>Gallon</u>	<u>gal</u>	<u>gal</u>	<u>gal</u>	<u>GAL</u>
<u>pennyweight</u>	<u>dwt</u>	<u>dwt</u>	<u>dwt</u>	<u>DWT</u>	<u>Ampere</u>	<u>A, I</u>	<u>A, I</u>		<u>A, I</u>
<u>ounce troy</u>	<u>oz t</u>	<u>oz t</u>	<u>oz t</u>	<u>OZ T</u>	<u>resistance</u>	<u>ohms</u>	<u>ohms</u>	<u>ohms</u>	<u>OHMS</u>
<u>milliliters</u>	<u>mL</u>	<u>mL</u>							
<u>centiliter</u>	<u>cL</u>	<u>cL</u>							

Discussion: The WWMA notes that the current General Code Table 1 Representation of Units does not include many units that are in common use today.

At its 2004 meeting, the WWMA indicated that unless it receives a report on the development of the table, the proposal will be withdrawn from its September 2005 agenda.

To provide input on this proposal, contact Gary Castro, California Division of Measurement Standards, by at (916) 229-3018, by fax at (916) 229-3015, or at gcastro@cdfa.ca.gov.

Part 2, Item 1 Scales: Table 4. Minimum Test Weights and Test Loads

Source: Northeastern Weights and Measures Association (NEWMA)

Recommendation: Modify Table 4. Minimum Test Weights and Test Loads as follows:

Table 4. Minimum Test Weights and Test Loads¹			
Device capacity	Minimums (in terms of device capacity)		(where practicable)
	Test weights (greater of)	Test loads ²	
0 to 150 kg (0 to 300 lb)	100 %		
151 to 1 500 kg (301 to 3 000 lb)	25 % or 150 kg (300 lb)	75 %	Test weights to dial face capacity, 1 000 d, or test load to used capacity, if greater than minimums specified
1 501 to 20 000 kg (3 001 to 40 000 lb)	12.5 % or 500 kg (1 000 lb)	50 %	
20 001 kg+ to 250 000 kg (40 001 lb+ to 500 000 lb)	12.5 % or 5 000 kg (10 000 lb)	25 % ³	During initial verification, a scale should be tested to capacity.
¹ If the amount of test weight in Table 4 combined with the load on the scale would result in an unsafe condition, then the appropriate load will be determined by the official with statutory authority. ² The term "test load" means the sum of the combination of field standard test weights and any other applied load used in the conduct of a test using substitution test methods. Not more than three substitutions shall be used during substitution testing, after which the tolerances for strain load tests shall be applied to each set of test loads. ³ The scale shall be tested from zero to at least 12.5 % of scale capacity using known test weights, and then to at least 25 % of scale capacity using either a substitution or strain load test that utilizes known test weights of at least 12.5 % of scale capacity. Whenever practical, a strain load test should be conducted to the used capacity of the scale. When a strain load test is conducted, the tolerances apply only to the test weights or substitution test loads. (Amended 1988, 1989, 1994, and 2003 and 200X)			

Discussion: Jurisdictions encounter scales with 1 000 000 lb nominal capacity and must determine the minimum test load. NEWMA finds that NIST Handbook 44 is flexible, but does not provide any definitive guidelines on test loads for large-capacity scales. NEWMA modified its original proposal by reducing the scale maximum capacity from 1 000 000 lb to 500 000 lb and removing a proposed new footnote that permitted officials to establish the minimum test load. Industry and other regional associations have developed alternate proposals to address their concerns that the proposal does not address the minimum test load and test weights requirements for a scale with a nominal capacity greater than 500 000 lb.

The Committee agreed that Table 4 is the appropriate place in Handbook 44 to provide guidance on the appropriate minimum test load for tests on scales that exceed capacities of 400 000 lb. The Committee believes this issue is a high priority but requires further review and input from both the public and private sectors.

To provide input on this proposal contact Michael Sikula, New York Bureau of Weights and Measures at (518) 457-3452, by fax at (518) 457-2552 or at mike.sikula@agmkt.state.ny.us.